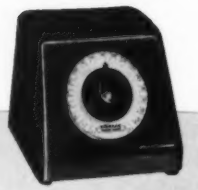
MODERN PLASTICS

OCTOBER 1950

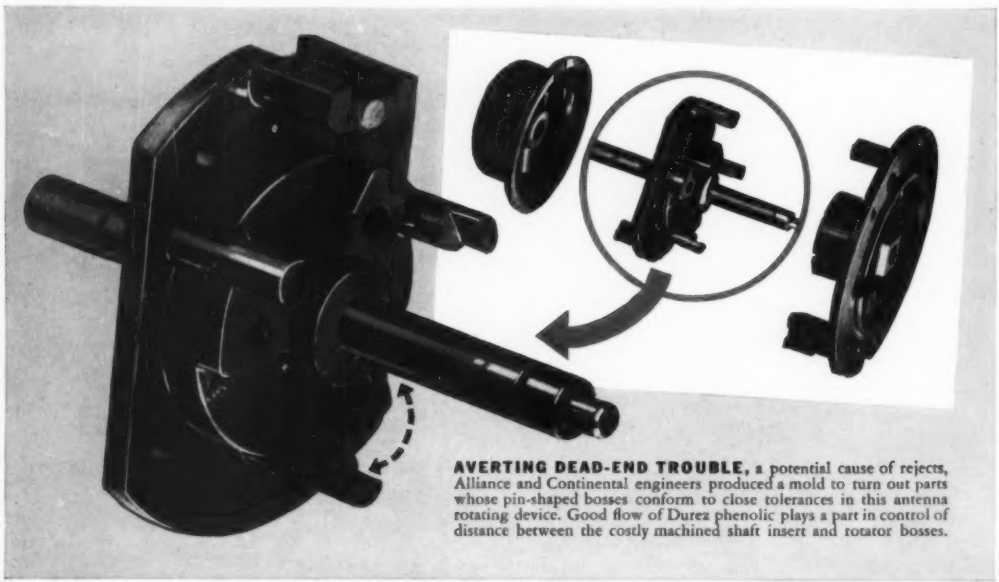
It pays to use your custom molder's know-how

When you're rough on rejects, tough on tolerances



No. 22 in a Series on Plastics Skill at Work...

PROJECT:	CUSTOMER:	MOLDER:	MATERIAL:
Control assembly for TV antenna rotator	Alliance Mfg. Co., Alliance, Ohio	Continental Can Co.— Plastics Div.	General-purpose brown Durez phenolic



AVERTING DEAD-END TROUBLE, a potential cause of rejects, Alliance and Continental engineers produced a mold to turn out parts whose pin-shaped bosses conform to close tolerances in this antenna rotating device. Good flow of Durez phenolic plays a part in control of distance between the costly machined shaft insert and rotator bosses.

● Today you can insist that the Durez parts you plan for your product measure up to top standards of uniformity. Experienced molding firms, accustomed to meeting rigid tolerance requirements, bring to your molding jobs a background of design, engineering, and production that is completely reliable.

This means that the earlier you call in the molding men, the more they can help you to get the most and the best for your plastics dollars.

So it worked out for the Alliance Mfg. Co. with this control assembly for the automatic "Tenna-Rotor." Extreme precision in mold design and molding was essential to meet the close tolerances required for satisfactory performance of the TV antenna rotator.

Cooperating closely with Continental engineers, this customer obtained a mold which prevented the rejects often caused by gases trapped in dead-end cavities. Too, they were able to use a Durez plastic of general-purpose grade, which provided the desired electrical and mechanical characteristics . . . and smooth finish . . . at a moderate price per pound.

Working closely with the molding industry, Durez field technicians help your molder use the versatile properties of Durez phenolics to your advantage. They are always available for consultation with molders and with your design and production men.

Our monthly "Durez Plastics News" contains many useful ideas. May we place you on the list? Durez Plastics & Chemicals, Inc. 1210 Walck Rd., N. Tonawanda, N. Y.

DUREZ

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- INDUSTRIAL RESINS
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Catalin Styrene

Assured and inspired by informative labeling that each placement is shatterproof and hot-water-washable, the consumer has, in Veilexware a decoratively festive, popularly priced table service too tempting to resist! Each of this new line's ten authentically styled designs dramatically combines clear* CATALIN STYRENE *with a choice of three richly transparent hues (ruby, mint, sapphire)* *** CATALIN STYRENE *is extensively versatile — so capable of bringing new life and rich color at low cost to modern products.*

*Product of Century Plastics, Hudson, Mass.

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MODERN PLASTICS*

VOLUME 28 OCTOBER 1950 NUMBER 2

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*Reg. U. S. Pat. Office

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B. F. Goodrich Chemical Company *raw materials*

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But that's not Geon's only advantage. The tubing must be transparent. Tubing extruded from Geon can be made so—or translucent or opaque. The tolerance can be held within ±.003″ on the diameter.

Consider, too—products of Geon can be made resistant to heat and cold, weather and wear—to abrasion, water, grease, oil, oxidation and many chemicals. Colors can be brilliant or delicate.

Geon is used in many fields, in many ways. It may be the key to unlock new production economies for you—for improving or developing products. We'll gladly give you helpful service. For technical bulletins, please write Dept. GA-10, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable.

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

SYLVANIA . . . *and Chicago Molded Plastics*

● *Sylvania . . . one of the oldest manufacturers of radio tubes . . . now presents its first radio receiver. This new unit has excellent tone quality and, by the utilization of four multi-purpose tubes, delivers six-tube "Studio Clear" performance. It is available with either black, walnut or ivory plastic cabinet and, like other Sylvania products, is taking its place among the leaders.*

We feel it is significant that, in producing its first radio, Sylvania entrusts the molding of the cabinets to Chicago Molded who were the first to mold radio cabinets from modern plastic materials.

* * * *

TODAY, with the completion of a substantial addition to our plant, Chicago Molded will have nearly three acres devoted exclusively to custom molding of plastics. Big? Yes. It's simply the logical result of more than 30 years of sound, consistent growth based on sincere service to industry.

During these years we have been responsible for many important developments in plastics molding. We have pioneered the development and production of many new molded plastics products. We have not just kept abreast of the times, but always a few steps ahead.

Our plant houses the most modern facilities including every needed size and type of equipment for compression, injection and plunger molding of even the largest pieces. Our mold-making department is second to none in the industry. And our engineering, designing and product development personnel includes outstanding authorities in plastics.

Perhaps that's why so many industrial leaders come to Chicago Molded . . . not just once, but again and again. We believe you, too, will find it worth while to discuss your plans with a Chicago Molded engineer. Write or phone. There's no obligation.

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Representatives in principal industrial centers

COMPRESSION, INJECTION AND PLUNGER MOLDING OF ALL PLASTIC MATERIALS

EDITORIAL

This is No Time to Stand Still

Out of the rumor mill and through the tortuous paths of hearsay come some frightening impressions—on which all too many businessmen, being but humanly emotional, are too prone to make decisions.

The current mass of misinformation about supplies of plastics raw materials is causing some molders, fabricators, processors, and some industrial end users of plastics needless worry. Further, it is causing them to make decisions to limit development programs, delay needed expansion, and postpone wanted new products. In our opinion this induced attitude of forlorn fatalism is one which these companies will regret later on, because the decisions are not based on established fact.

There is a war in Korea. We are entering on a colossal mobilization program. We may soon have another world conflict—or maybe we will have it later. Or perhaps for decades to come the United States may be fighting pocket-handkerchief wars all over the face of the world.

At the worst, this may result in a drain-off of from 5% to 10% of steel production, might close domestic markets to some plastics, might or might not adversely affect supplies of fibers, plasticizers, pigments, and many other things. At best, the emotional reaction of businessmen and consumers to war news and pronouncements from Washington will result in spot pressures on supplies of this, that, or the other material.

All of which certainly makes this no time to cry havoc, no time to stand still and just worry.

The salient fact is that plastics supplies are in key with recorded production highs although admittedly well below present product sales potential. As one sales manager put it: "Business is three times as good as it was in 1945; supplies are only twice as good."

Who is going to get plastics? Molders and end users who have shown steady and sound progress, who have been fair and honorable in their treatment of supply sources, who were making well-designed, stable, and worthwhile products have no need to worry. The "cats and dogs," the marginal or fringe operators who have bought materials hither and yon, from hand to mouth with which to make badly conceived junk have plenty to worry about.

Materials supply houses have been forced by anticipated demands from molders to scan their accounts and the products of their accounts and the business records of their accounts closely. They have been forced into voluntary allocation based on the integrity of the customer. The steady and logical purchaser of material to be used in the making of worthwhile consumer items will continue to receive an equitable share of available supplies.

The supply shortage is a shortage only in relationship to possible volume in a time of inflated economics. It is not a valid excuse for retrenchment by any stable user of plastics. It is not a sound reason for delay of plant improvement or product development programs.

And should the worst happen and world war come again, the companies that will produce the war materials in greatest volume and most efficiently are those companies that have always maintained good source relationships, that have kept their plants up to production pitch, that have steadily proceeded with development work.

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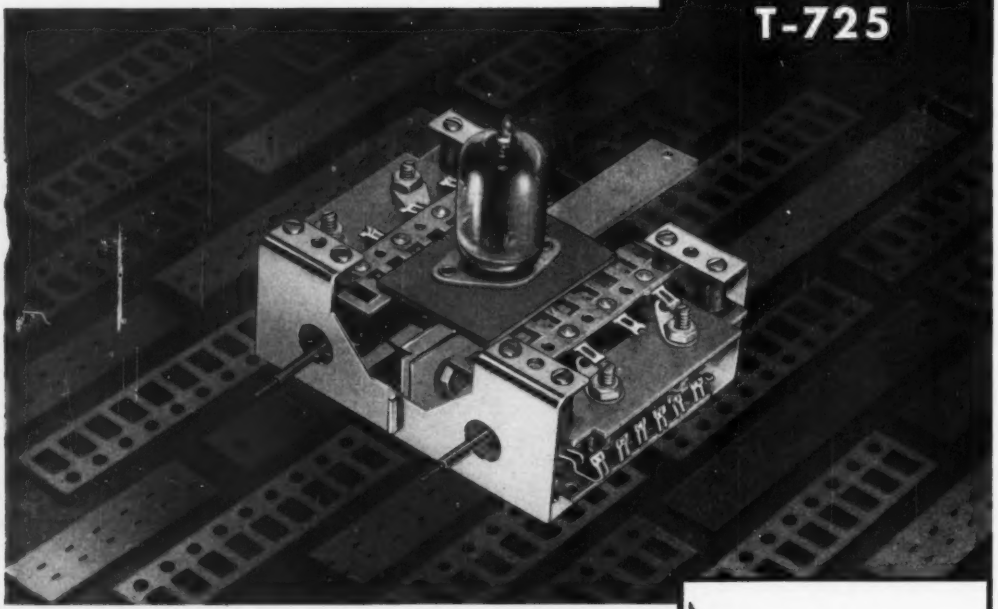
Another "DESIGN HEADACHE" solved by INSUROK* T-725



Centralab† required a superior combination in the insulation for this unique slide switch used in Anchor Radio's TV preamplifier

At the high frequencies encountered in TV equipment, insulating materials must possess a unique combination of many properties. To find such a material for its intricate slide switches, used in Anchor Radio's TV preamplifier, was the problem faced by Centralab engineers.

INSUROK T-725 laminated plastic insulation proved to be the answer. It had the necessary physical strength and electrical properties. It was stable under elevated temperatures and high humidity. And, from piece to piece, it remained uniform.

In hundreds of similar applications, laminated and molded INSUROK are solving difficult problems for industry. Richardson's years of experience in the engineering application of plastics are available to you without obligation. Write, today.

1. Uniform quality
2. Low electrical loss
3. Resistance to moisture
4. Electrical stability over a wide temperature range
5. Mechanical strength
6. Close tolerances

Write for Descriptive Data Sheet T-725

*Reg. U. S. Pat. Off.

†DIVISION OF GLOBE-UNION INC., MILWAUKEE

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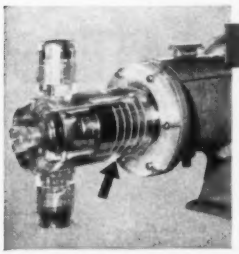
Have you heard about "TEFLON"?

the new heavy-duty Du Pont plastic with a unique combination of properties

This new Du Pont plastic tops all other commercial plastics in resistance to chemicals, heat, and moisture. Here are the outstanding properties "Teflon" tetrafluoroethylene resin has to offer industry:

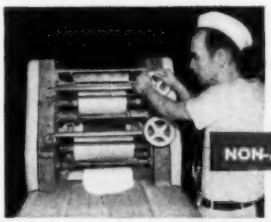


CHEMICAL PROPERTIES

"Teflon"* is superior in chemical resistance to any other known material for gaskets and pump packings. It has been used successfully with the most corrosive acids—has performed over a year in gaskets where other materials lasted only two weeks. It has excellent heat-resistance, is extremely tough and durable. In packings, as in the proportioning pump shown here, "Teflon" offers chemical inertness, heat-resistance and low coefficient of friction, is excellent for valves, for high- and low-speed applications. "Teflon" finishes are being evaluated in corrosion-resistant coatings on tanks and pipes.

ELECTRICAL PROPERTIES

"Teflon" gives outstanding performance as insulation in high-frequency, high-temperature and high-voltage electrical installations, service otherwise impossible in a thin, flexible jacket. It is excellent for motor windings, high-voltage wires and cables, inserts for coaxial connectors, coaxial spacers (in TV transmission lines like the one shown here). "Teflon" has a very low power factor (0.0005) and low dielectric constant (2.0) which are constant over the entire frequency range measured to date. Its electrical properties are unaffected by moisture, or by temperatures as high as 400°F. It is unaffected by weathering, has zero water-absorption and high impact strength even at very low temperatures.



NON-ADHESIVE PROPERTIES

Nothing will stick to "Teflon" with any appreciable strength. This bakery roll is an outstanding example of an industrial use where non-sticking surfaces are needed. The fact that dough won't stick to the rolls covered with "Teflon" eliminates the need for scrapers to clean the rolls, eliminates flour dusting during sheeting of dough—bringing about substantial savings. Other uses: coverings for jaws of heat sealing machines, covers for conveyors and rolls handling sticky materials, linings for bread pans, mold-release agents.

Du Pont supplies "Teflon" as molding powder, tape, and in its new form of suspensoids—stable aqueous dispersions containing 50% solids. It can also be obtained in lacquers and enamels. We will gladly suggest suppliers of rods, sheets, tubes, and finished parts made of "Teflon."

New, Modern Plant

While "Teflon" has been available to industry for just a short time, its success in a variety of applications, plus the promise that it holds for future uses, has hastened the completion of a full-scale modern plant. Techniques now being developed will certainly open up fields not yet contemplated. For more information on "Teflon" mail coupon to the sales office nearest you.

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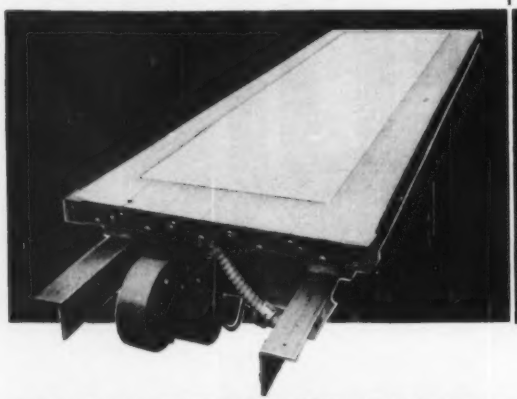

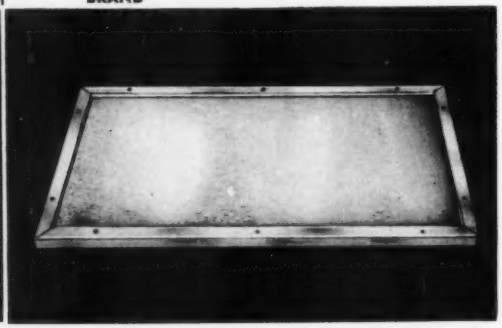

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A product of *Industrial Radiant Heat Corporation*, Gladstone, New Jersey. Panels built to any specified size, any voltage.

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*Reg. U. S. Pat. Off. **PLASTICS**

Watson-Standard laboratories have wide experience in the development of vinyl plastisols. These plastisols have been accepted in the vinyl molding industry.

The outstanding properties are ease of molding, permanent flexibility, good chemical resistance, color stability and durability.

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Independent Testing Laboratory reports Watson-Standard plastisols show no appreciable evidence of plasticizer migration.*

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Decorative lacquers are now available as an additional service to the plastic molder. These lacquers are made specifically for adhesion to plastisols.

Let us help you with molding problems. Write today.

*Copy of laboratory report will be mailed on request.

Send for your copy of technical paper entitled "Slush Moldings." It's free!

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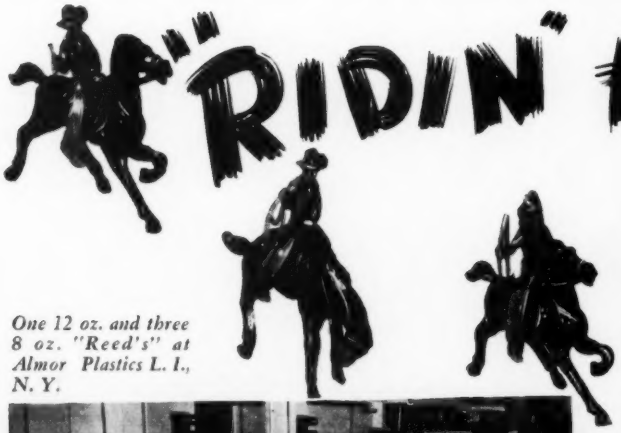
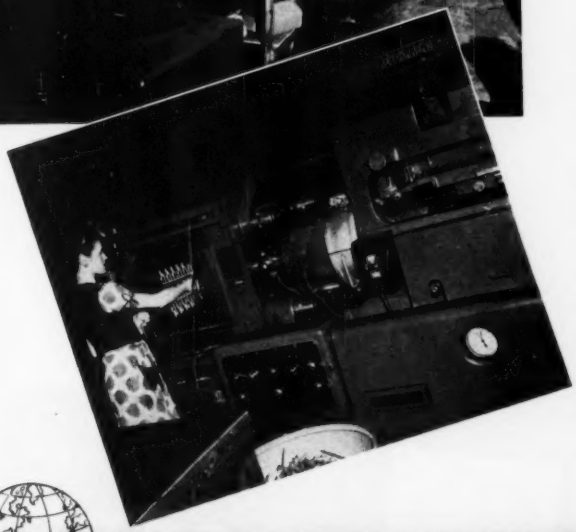


WITH REED-PRENTICE MACHINES

One 12 oz. and three 8 oz. "Reed's" at Almor Plastics L. I., N. Y.



● Over eight hundred injection molders are "Ridin' High" at the top of the plastics industry with dependable, profit-making Reed-Prentice Injection Molding machines.

Almor Plastics Corp. of Astoria, L. I., New York, is one of the most energetic concerns in this group. At the Almor plant, a 12 oz. "Reed" operates continuously on a fast 20-second cycle, producing miniature plastic Cowboys and Indians in a multiple-cavity shot.

With the tremendous overall production possible and the freedom from down-time, it's easy to understand why profit-wise molders are standardizing on Reed-Prentice machines — available in all desired capacities — from 2 to 60 oz.

●

A new booklet — "Outstanding Molding Achievements" — shows what Reed-Prentice injection presses can do. Send for your free copy today.

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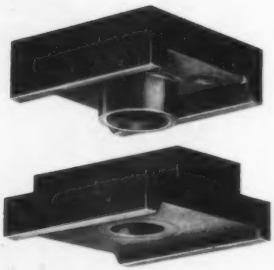

OVER PEOPLE'S HEADS FOR MORE THAN TEN YEARS

For 14 years, the General Industries Co., has been molding insulator blocks for overhead cranes manufactured by the American MonoRail Company. Almost from the start, General Industries has used Rogers RM-9725 exclusively. A dependable molder using a dependable material.

Rogers RM-9725 is a phenolic molding board uniquely qualified for responsible parts. It offers excellent dielectric qualities, in combination with high impact and flexural strengths. It molds in the same molds as general purpose materials. Quality control assures uniformity, batch after batch, year after year.

Get the whole story on Rogers high strength materials. Write for our catalog or ask to have a technical representative call.

Write Department P

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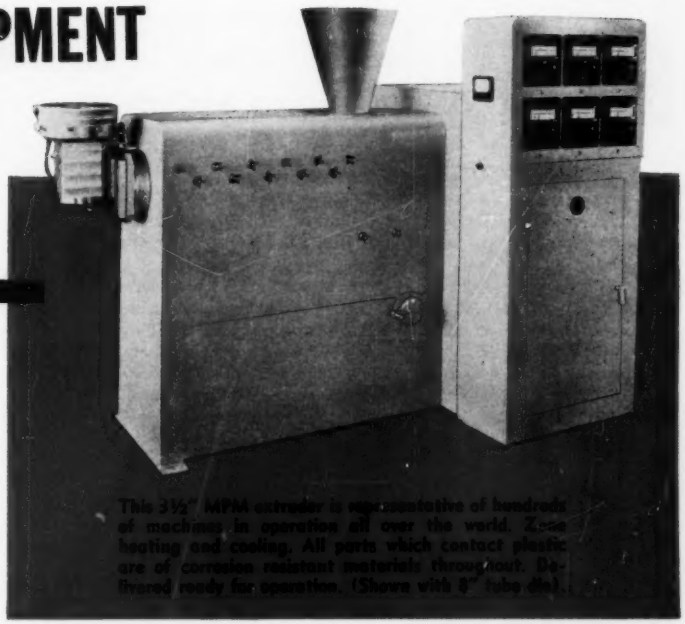
ALMOST ANY EXTRUSION JOB IS A JOB FOR MPM EQUIPMENT

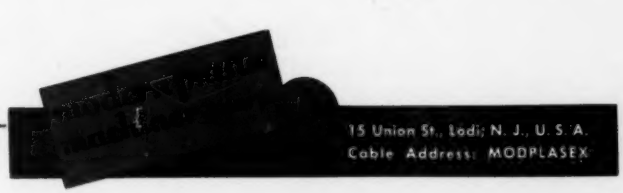


This 3½" MPM extruder is representative of hundreds of machines in operation all over the world. Zone heating and cooling. All parts which contact plastic are of corrosion resistant materials throughout. Delivered ready for operation. (Shown with 8" tube die).

Making rods or tubes? Covering wire? Compounding thermoplastics? Extruding films? If you're doing any of these jobs with MPM extruders and auxiliary equipment, the probability is you are producing a superior product at a cost that competition is hard pressed to match.

Thanks to the excellence of features such as screw construction, heat control, die head design and bearing capacity, fine MPM extruders are able to extrude an extremely wide range of materials and products. List your requirements; we will do our best to deliver the goods.

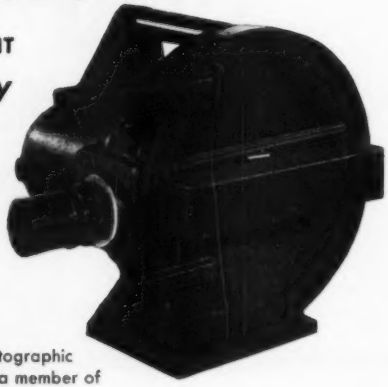
Descriptive Brochure Available



15 Union St., Lodi, N. J., U. S. A.
Cable Address: MODPLASEX

2 GREAT NAMES JOIN HANDS . . . . . Wollensak FASTAX

Edward A. Springer, PRESIDENT *Wollensak Optical Company Announces Purchase of Fastax High Speed Camera*



Wollensak Optical Company has purchased outright from Western Electric Company the Fastax High Speed Motion Picture Camera, together with all rights for exclusive manufacture and distribution. By acquiring the Fastax, Wollensak will be able to render an immeasurable service to many industries and scientific laboratories.

The Fastax Cameras, part of our new Industrial and Technical Photographic Division, will be headed by John H. Waddell, for twenty-one years a member of the Technical Staff of Bell Telephone Laboratories. Under his guidance the Fastax was perfected. Mr. Waddell has also been photographic consultant to both the Army and Navy, and was a consultant to the Army Air Force on the Bikini Experiments. He will personally attend to all inquiries regarding the Fastax and to all problems of high speed photography.

E. A. Springer

ACQUISITION OF FASTAX HIGH SPEED CAMERAS ANOTHER EXAMPLE OF WOLLENSAK LEADERSHIP IN THE PHOTOGRAPHIC FIELD

The Fastax, a continuous moving film type camera, is rated not only as the highest speed commercial camera of its type made, but also the most versatile device for recording high speed motion, of either a repetitious or transient nature. Produced in three sizes—to accommodate 8mm, 16mm and 35mm film—it takes motion pictures at a speed of 150 to 10,000 frames a second with an exposure time of 1/50,000 of a second. The purpose of the Fastax is to make available to engineers and scientists a tool for the close study of high speed phenomena now beyond the perception of the human eye.

Wollensak is proud to have Fastax in its line of products . . . particularly since the camera's inception it has been equipped with Wollensak optics.

Wollensak
MEANS FINE LENSES
OPTICAL CO., ROCHESTER 21, N. Y.

- DISTRIBUTOR IN THE UNITED STATES
  GRAYBAR ELECTRIC COMPANY
  420 Lexington Avenue, New York 17, N. Y.
  Or Your Local Branch
- DISTRIBUTOR FOR CANADA AND NEWFOUNDLAND
  Northern Electric COMPANY LIMITED
  1620 Notre Dame Street, W., Montreal, P. Q., Canada
  Or Your Local Branch
- FOREIGN DISTRIBUTOR (Except Canada and Newfoundland)
  Westrex Corporation
  111 Eighth Avenue, New York 11, N. Y., U.S.A.

A COMPLETE LINE OF PLASTICS MOLDING MACHINERY

From 2... to 200 oz.

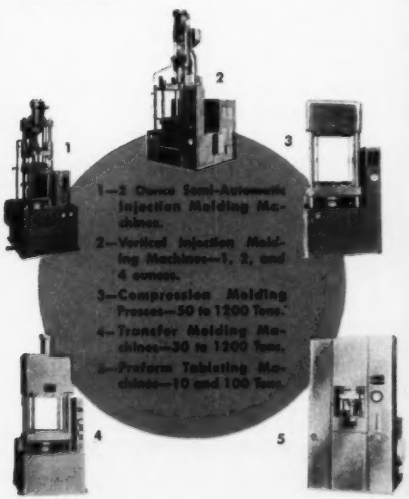
...and, all are obtainable from one source of supply—Watson-Stillman.

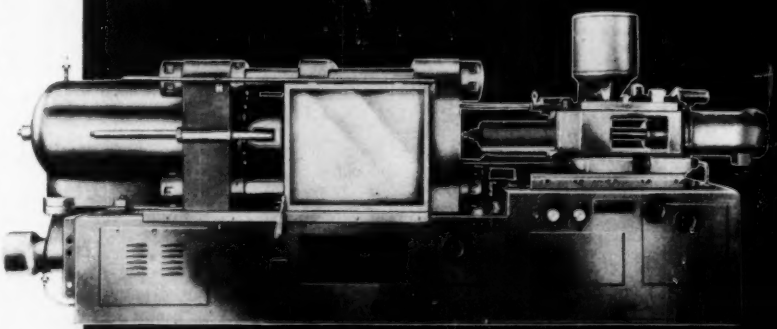
Since the very inception of the industry over 50 years ago, Watson-Stillman engineering ingenuity has paced the industry, year after year, with outstanding plastics molding machinery advancements.

Today, from the W-S "COMPLETELINE" of Injection, Transfer and Compression Molding Machines, you can select a model to fit every production requirement—large and small.

And, W-S offers many additional services. Mold designs, material selection, operation, maintenance, plant layout, are all subjects about which W-S is in a particularly good position to give advice to its clients as a part of its "COMPLETELINE" service.

When planning plant extension or a new business, consult W-S *first* about plastics machinery and how to use it.





Horizontal Injection Molding Machines—8 to 120 Ounces

WATSON-STILLMAN

ESTABLISHED 1848 *HYDRAULIC MACHINERY DIVISION*

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Manufactured in Canada by CANADIAN VICKERS, Ltd., MONTREAL

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Indianapolis 20, Ind. W. K. Millholland Machinery Co.	San Francisco 7, Calif. Schellenbach Mach. Tool Co.
Los Angeles 11, Calif. H. M. Royal, Inc.	St. Paul 4, Minn. Anderson Machine Tool Co.
Pittsburgh 19, Pa. Stanley Berg & Co.	Seattle, Wash. Machinery & Tool Supply Co.
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460 Fourth Avenue, New York 16, N. Y.
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R-K-13A

MANUFACTURERS OF THE MOST COMPLETE LINE OF HYDRAULIC MACHINERY

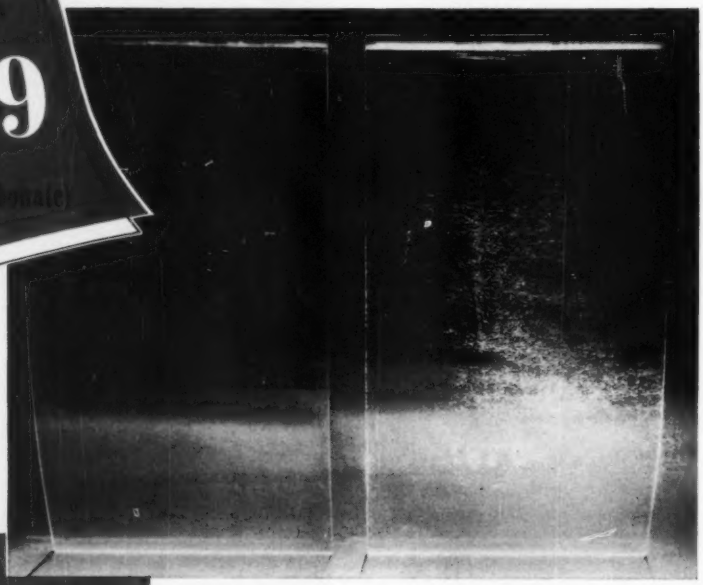
COLUMBIA MONOMER*

CR 39

(Allyl Diglycol Carbonate)

Columbia CR 39 Sheet
NO SIGN OF CRAZING

Common Thermoplastic
EXTENSIVE CRAZING



Tests *prove* its high resistance to crazing, chemical and solvent attack, abrasion, distortion, weather, shock . . .

***without sacrificing* OPTICAL CLARITY**

Unretouched photograph above shows a CR 39 sheet and a common thermoplastic sheet, laid side by side, and subjected to identical conditions of stress. A light spray of acetone was applied to both materials to accelerate crazing and to demonstrate the solvent action. Benzene may be used in place of acetone.

The results can be seen clearly. CR 39 shows no effect, is exceptionally resistant to crazing and solvent attack, while the common thermoplastic crazes extensively and suffers distortion.

You are invited to make this same simple test with the plastic you are now using.

When submitted to other types of rigid tests such as marring or rubbing (Taber method) or by impinging (falling emery), CR 39 sheets prove highly resistant to surface abrasion and actual wear when compared with other transparent organic plastics.

Despite abuse and unfavorable climatic conditions, products of CR 39 show no appreciable decrease in clarity or light transmission. The properties of CR 39 therefore make it extremely advantageous for radio and aircraft instrument panels, safety goggles, welders' helmets, industrial crane enclosures, watch crystals, rear lights for convertible tops and numerous other commercial and military uses.

If your present products, or those in the design stage, call for such a material, we suggest you investigate CR 39 immediately. Write Pittsburgh Plate Glass Company, Columbia Chemical Division, Dept. P, Fifth Avenue at Bellefield, Pittsburgh 13, Pa.

*

CR 39 as furnished by Columbia is a clear, colorless, water insoluble organic liquid of low viscosity.

CR 39 is available in transparent cast sheets of various standard or custom sizes, or in finished objects, from:

CAST OPTICS CORPORATION
1 Post Road, Riverside, Connecticut

HOMALITE CORPORATION
11-13 Brookside Drive, Wilmington 166, Delaware

OPTICAL PLASTICS CORPORATION
69 Southfield Street, Stamford, Connecticut

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PAINT • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

When you think of PLASTICS...

THINK OF THIS!

Distributor head for Scintilla Magneto Division, Bendix Aviation Corp. Moulder, Kurz-Kasch.

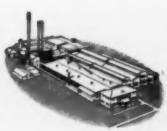
Here's a guidepost for you, whatever your interest in plastics. Here's everything that's excellent in plastics—type of application—specialized material—design—mouldmaking—moulding. Today, as in World War II, this Scintilla distributor head is considered an all-time plastics classic. We're still producing it (from the original moulds) for use in two of America's best-known aircraft engines. The special Melmac material formulated for this job gives a piece that is both heat and cold-resistant for high-altitude engine performance. It is highly stable, has high impact and dielectric strength, is non-crack, and will not support combustion. The piece is transfer moulded from electronically preheated preforms, and contains 26 inserts of 7 different types. Finishing operations include electronic inspection for arcing and tracking. Final result is one of the finest distributor heads ever developed.

Looking for a custom moulder? Why not choose one who's played a vital part in the industry's most famed production! Us . . . Kurz-Kasch! We have *all* the facilities. Just call.

Kurz-Kasch

FOR OVER 34 YEARS PLANNERS AND MOULDERS IN PLASTICS

Kurz-Kasch, Incorporated • 1415 South Broadway • Dayton 1, Ohio



BRANCH SALES OFFICES: New York, *Lexington 2-6677* • Chicago, *Harrison 7-5473* • Detroit, *Trinity 3-7050* • Philadelphia, *Granite 2-7484* • Dallas, *Lakeside 1022* • Los Angeles, *Prospect 7503* • St. Louis, *Delmar 9577* • Toronto, *Adelaide 1377.*

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Tomorrow, A Garden!

Almost overnight man can transform a barren desert into life-giving, productive soil. So, too, Columbia's technicians and creative engineers will take a manufacturer's basic idea and fashion from it a finished, marketable plastic product of unlimited sales potential.

Columbia

CUSTOM MOLDERS OF PLASTIC PRODUCTS AND SPECIAL PLASTIC PACKAGING

COLUMBIA PROTEKTOSITE COMPANY, INC. • Carlstadt, New Jersey

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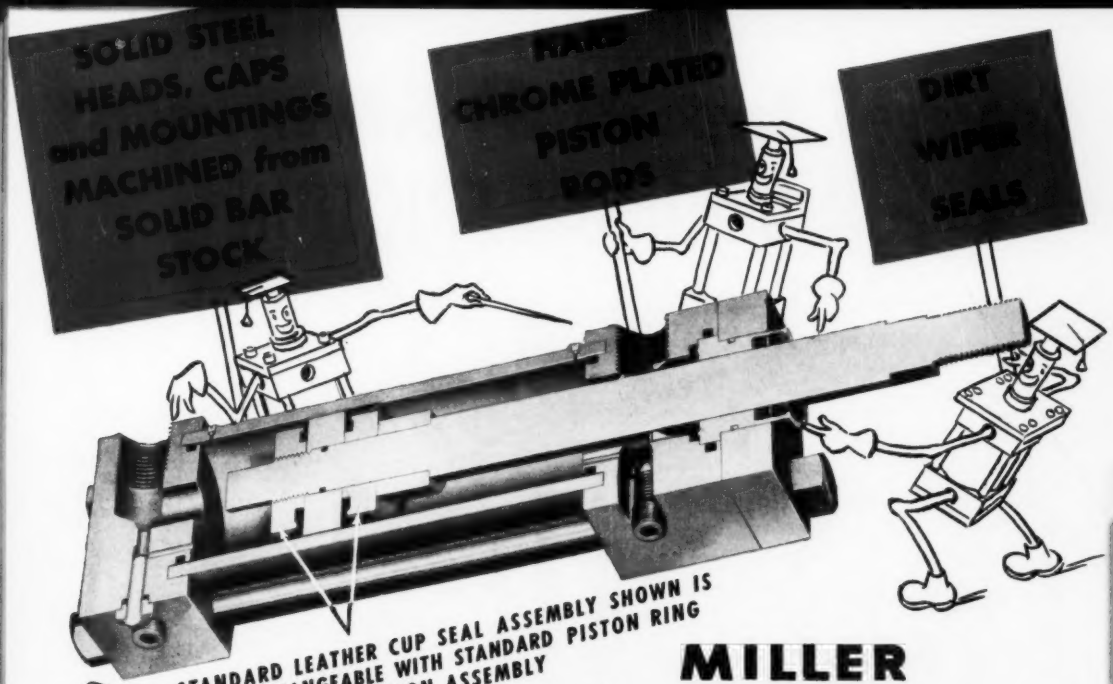
ONE OF AMERICA'S LEADING MANUFACTURERS OF SUN GLASSES, COMBS, BRUSHES, TOYS, HOUSEWARES



STANDARD LEATHER CUP SEAL ASSEMBLY SHOWN IS INTERCHANGEABLE WITH STANDARD PISTON RING PISTON ASSEMBLY

MILLER

High Pressure

HYDRAULIC CYLINDERS

Meet J. I. C. HYDRAULIC STANDARDS

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the *standard* design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing"

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY
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AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR HOISTS

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MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
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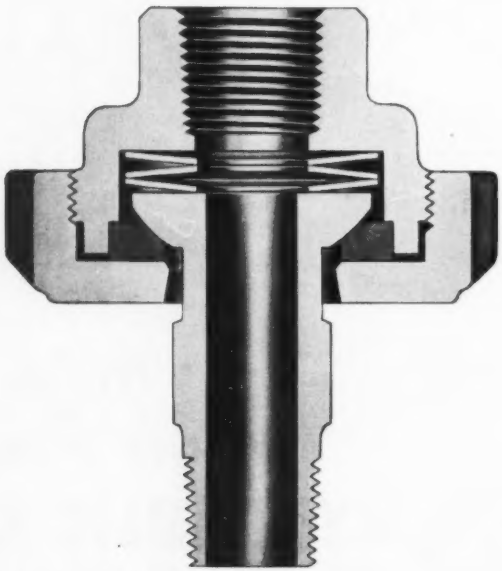
Sales and Service from coast to coast

Improved Barco Rotary Swivel Joints
FOR MINIMUM FRICTION



FRICTION-FREE PERFORMANCE WITH LOWER TURNING TORQUE. This compact, lightweight, low cost joint is especially efficient at high and low temperatures and pressures. It handles alternating steam and cold water without leakage. It is much more compact for the same capacity and has performed successfully on continuous rotation applications up to 30 RPM. This new, low torque joint will greatly reduce power costs and worker fatigue. It is practically maintenance free.

WIDE TEMPERATURE AND PRESSURE RANGES. The new Barco Rotary Swivel Joints withstand these extreme ranges with complete safety, no chance of bursting. Angular motion compensates for misalignment and there is no restricted internal diameter as in flexible hose.

Install these remarkable joints now. Our engineers will gladly discuss your problems. Sizes ⅜", ½", ¾", 1". When ordering, give complete information about pressures, temperatures, fluids or gases, and any other special conditions.

BARCO ***FLEXIBLE JOINTS***

Not just a swivel joint ...but a combination of a swivel and ball joint with rotary motion and responsive movement through every angle.

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

"MOVE IN EVERY DIRECTION"

1809K Winnemac Avenue, Chicago 40, Illinois • *In Canada:* THE HOLDEN CO., LTD., MONTREAL, CANADA

Improve quality–cut costs with **AMOS PLASTICS**

▶ Amos' new larger equipment molds *bigger, better* parts for every industry . . .

For example, Admiral's beautiful 19" TV Lens shown above measures 20½" X 17"— a 47-ounce piece.

Amos accepts undivided responsibility. *Does the complete job right* . . . DESIGN, ENGINEER, TOOL, MOLD and FINISH . . . all under one roof in one of the *most modern* plants in the industry. Call AMOS . . . *Now!*

Write for our new 52-page booklet, picturing in full color AMOS facilities—showing many parts and products pioneered in many industries.

Injection Molding Specialists — 8 to 300-ounce machine capacity

From the Industrial Plastics' Notebook...

Handles Requiring Close Control

Molding and finishing department work as a team to fulfill requirements. Body and Cap held to close tolerance during molding for assembly ease. Assembled handles undergo rigid strength and water-tight tests. Mechanized finishing line required to meet necessary economy. Result—requirements fulfilled and customer satisfied.

Handles for ETERNA line kitchen tools molded for Ekco Products Company, Chicago, Illinois.

Take a note from the many customers who, by repeating orders from year to year, have indicated their complete satisfaction with molding done for them by Industrial Plastics. Ask us to explain what our thorough engineering and design means in terms of your product's cost and performance. Ask us to prove what we can do for you. Write today. No obligation.

Industrial Plastics Co.

A Division of INDUSTRIAL ABRASIVES INC.

serves the Greatest Names in Industry!

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Cut costs—maintain quality

in vinyl compounds with

PLIOVIC

Combining high molecular weight and high vinyl chloride content, Goodyear's **Pliovic** resins give you advantages not found in other vinyl chloride copolymers.

With Goodyear's use-proved resin, you get all these:

Low-Cost Production because **Pliovic** can be more highly loaded with extender pigments with less sacrifice of physical properties.

Easier Processing at lower temperatures and with less plasticizer required; in organosols, **Pliovic** AO can be fused at lower temperatures.

High Quality—Outstanding strength, toughness at low temperatures, good heat and light stability, high resistance to flex-fatigue and excellent chemical resistance characterize **Pliovic** resins compared with other vinyl polymers.

Pliovic is available in three forms: **Pliovic** A, a general purpose resin; AR, identical but with a reduced bulking value, and AO, especially suited for organosols. Write today, for full details on all three forms, and samples for your own evaluation, to:

GOODYEAR, CHEMICAL DIVISION
AKRON 16, OHIO

Tests and actual production show **Pliovic** can be loaded with less sacrifice of physical properties. Photo shows laboratory Banbury being discharged in testing effect of use of fillers or extenders with **Pliovic**.

USE PROVED *Products*

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

GOODYEAR

Pliovic—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

NEED LARGE-SIZE PLASTIC TUBING?

YARDLEY EXTRUDES IT UP TO 8" O. D.

We built our reputation on small-size tubing made to "on-the-nose" specifications. Now we can supply on order "Tru-Size" tubing in diameters as large as 8". Any wall thickness, any material.

If density, freedom from strain patterns and close tolerances are important to you, compare Yardley "Tru-Size" tubing with any other, in any size, from 1/8" O. D. on up.

Give us your problem. Our engineers know materials. Our skilled production crews employ cost-saving methods that never sacrifice quality.

There's an experienced Yardley representative near you. We will send him promptly.

YARDLEY.
PLASTICS CO.
142 Parsons Ave. · ADams 9315
Columbus 15, Ohio

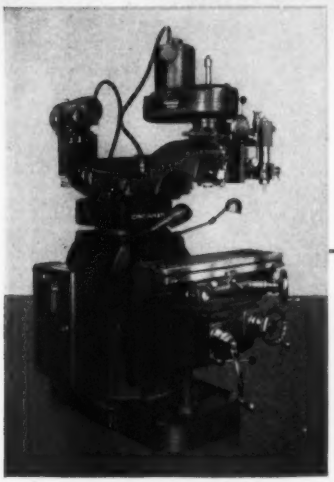
. . . ALSO PLASTIC PIPE IN IRON PIPE SIZES

Corrosion resistant, flexible or rigid. Standard sizes ⅛" to 6", complete with fittings and accessories, right from our warehouse. Send for bulletins.

LIGHT TOUCH ANGULAR TRACING

Eliminates a Lot of Hand Finishing

The cutter and tracing head of this CINCINNATI 8" x 18" Tool and Die Miller has been swiveled a few degrees to mill corners and the straight walls in a mold for a plastic handle.



CINCINNATI 8" x 18" Tool and Die Milling Machine. Catalog No. M-1620 contains complete specifications. Write for a copy.

Right: Drawing of plastic toaster handle. The mold for this part is being milled on the equipment illustrated above.

● Hard-to-get-at corners of a mold need not be such a big factor in the cost of hand finishing. Clean them out accurately on the die-sinking machine, and you will see hand finishing costs drop sharply. This is one of the advantages offered by CINCINNATI 8"x 18" Tool and Die Millers. For milling open-end square corners, the cutter spindle and tracing head may be swiveled as a unit 15° front or 35° back. ¶ Tracing and milling then proceed in the usual manner. The setup above illustrates this feature in milling a mold for a plastic handle. Other CINCINNATI 8" x 18" features are equally important in making plastic molds: handwheel table traverse with anti-friction screw; light pressure, automatic tracing; integral slotting attachment, if desired. Complete data may be obtained by writing for catalog No. M-1620.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

REPLACE WITH A *NEW* CINCINNATI

CINCINNATI

CINCINNATI

MILLING MACHINES • [illegible]
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • [illegible]

PROTECT
your vinyl plastics AGAINST BOTH LIGHT AND HEAT ...with these "Dutch Boy" Stabilizers

"DUTCH BOY" DYPHOS

Dibasic Lead Phosphite. The outstanding heat and light stabilizer for vinyl chloride polymers and copolymers. Dyphos is unexcelled in providing protection against the deleterious effects of *both* heat and light.

The remarkable effectiveness of Dyphos makes it possible to utilize chloroparaffins as low cost flame-resistant secondary plasticizers in quality products. Dyphos is also highly effective in plastisols and organosols.

TRADE NAME	CHEMICAL COMPOSITION	RECOMMENDED FOR USE IN
"Dutch Boy" Tribase	Tribasic Lead Sulphate	Electrical compounds
"Dutch Boy" Tribase E	Basic Lead Silicate Sulphate Complex	Low volume cost insulation
"Dutch Boy" DS-207	Dibasic Lead Stearate	Sheeting, extrusion and molded compounds, i.e., insulated wire and vinyl phonograph records
"Dutch Boy" Plumb-O-Sil A	Coprecipitate of Lead Orthosilicate and Silica Gel	Translucent and colored sheeting and upholstery stocks
"Dutch Boy" Plumb-O-Sil B	Coprecipitate of Lead Orthosilicate and Silica Gel	Translucent film and sheeting, belting
"Dutch Boy" Plumb-O-Sil B Electrical Grade	Coprecipitate of lead Orthosilicate and Silica Gel	High grade insulated wire and sheeting
"Dutch Boy" Dythal	Dibasic Lead Phthalate	General purpose stabilizer for heat and light
"Dutch Boy" Dyphos	Dibasic Lead Phosphite	Excellent for heat and light in all opaque stocks including Plastisols and Organosols
"Dutch Boy" Normasal	Normal Lead Salicylate	Vinyl flooring compounds. Rubber stocks as non-scorch activator

"DUTCH BOY" TRIBASE

Tribasic Lead Sulphate plus

"DUTCH BOY" DS-207

Dibasic Lead Stearate

The popular combination for good, all-around performance. Combines heat stability, light fastness and lubricity in processing.

"DUTCH BOY" DYTHAL

Dibasic Lead Phthalate. An excellent absorber of ultra-violet light, Dythal promotes light fastness in organic films. This advantage, combined with rugged heat stability derived from the basic character of this compound, makes Dythal the *general purpose stabilizer.*

Accelerated tests in the laboratory, plus outdoor exposure tests, show that Dyphos, Dythal, and Tribase — DS-207 greatly increase the useful life of plastic compounds.

For example, a compound containing Dyphos withstood over 2000 hours in the Weatherometer before failure.

"Dutch Boy" Stabilizers are a product of National Lead Company.

Our technical staff will help you stabilize vinyl resins for any use. Write for complete information.

Dutch Boy PRODUCTS

Reg. U.S. Pat. Off.

Dutch Boy

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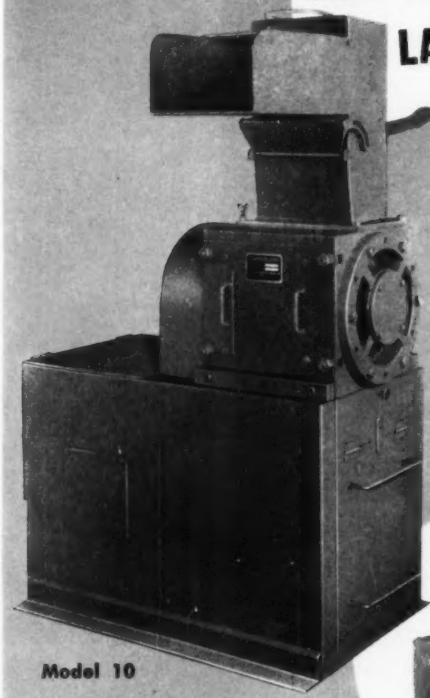
CHEMICALS

NATIONAL LEAD COMPANY

111 Broadway New York 6, N.Y.

NEW CUMBERLAND GRANULATOR HAS LARGE 6"x10" THROAT OPENING!



Model 10

DESIGNED FOR USE BESIDE EACH INJECTION MACHINE

Cumberland's new Model 10 granulating machine fills the urgent need for a high-quality granulator with a large throat opening to be used beside each injection molding machine.

Like all Cumberland machines, the new Model 10 is rugged, efficient, and easy to clean. And you'll appreciate its attractive price.

Dismantled View

SPECIFICATIONS
Throat opening: 6" x 10"
Motor: 3 HP, 1800 rpm
Floor space: 24" x 36"
Shipping weight: 1200 lbs.

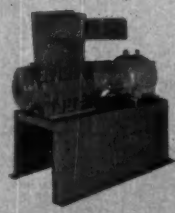
Write for further information.

CUMBERLAND

ROTARY CHOPPING MACHINE

Heavy duty, rugged machine. Used for cutting thick vinylite slabs from two roll mills. Also used as large capacity pelletizer. Other applications are described in Bulletin 400.

CUMBERLAND



GRANULATING MACHINE MODEL 18

Large capacity. Double hung construction. Easy to inspect, dismantle, and adjust. Further details are in Bulletin 250.

CUMBERLAND

GRANULATING MACHINES MODELS 0, ½, 1½

Small and medium capacity. Designed specifically for plastics. Rugged and easy to clean. Request Bulletin 250.

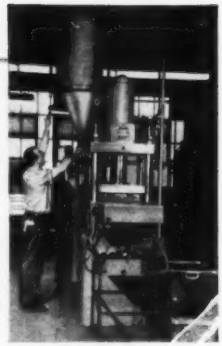
CUMBERLAND Engineering Company, Inc.

BUILDERS OF BETTER MACHINES FOR THE PLASTICS INDUSTRY

DEPT. I · BOX 218 · PROVIDENCE · RHODE ISLAND

California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
2325 Lyon Street, Los Angeles 23, Cal.

SYLVANIA ELECTRIC molds automatically at a profit!



Fully automatic molding presses at Sylvania Electric Products Inc., Warren, Pa., produce identically accurate parts . . . in all sizes and shapes . . . for use in the electrical and electronic fields.

Other than filling the hopper and removing completed parts at regular intervals, only spot checks are required of the presses and molded parts as they are ejected from the machine.

Production economies, marked improvement in part quality, and substantial savings in labor and material are realized when Stokes fully automatic molding presses are a part of production set-ups.

You can learn quickly if your parts are adapted to automatic molding . . . send parts or blueprints for a free analysis, without obligation.

STOKES MAKES Automatic and Semi-Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing Equipment, Water Stills and Special Machinery.

F. J. STOKES MACHINE COMPANY

5934 TABOR ROAD

PHILADELPHIA 20, PA.

F. J. Stokes Machine Co.
5934 Tabor Road
Philadelphia 20, Pa.

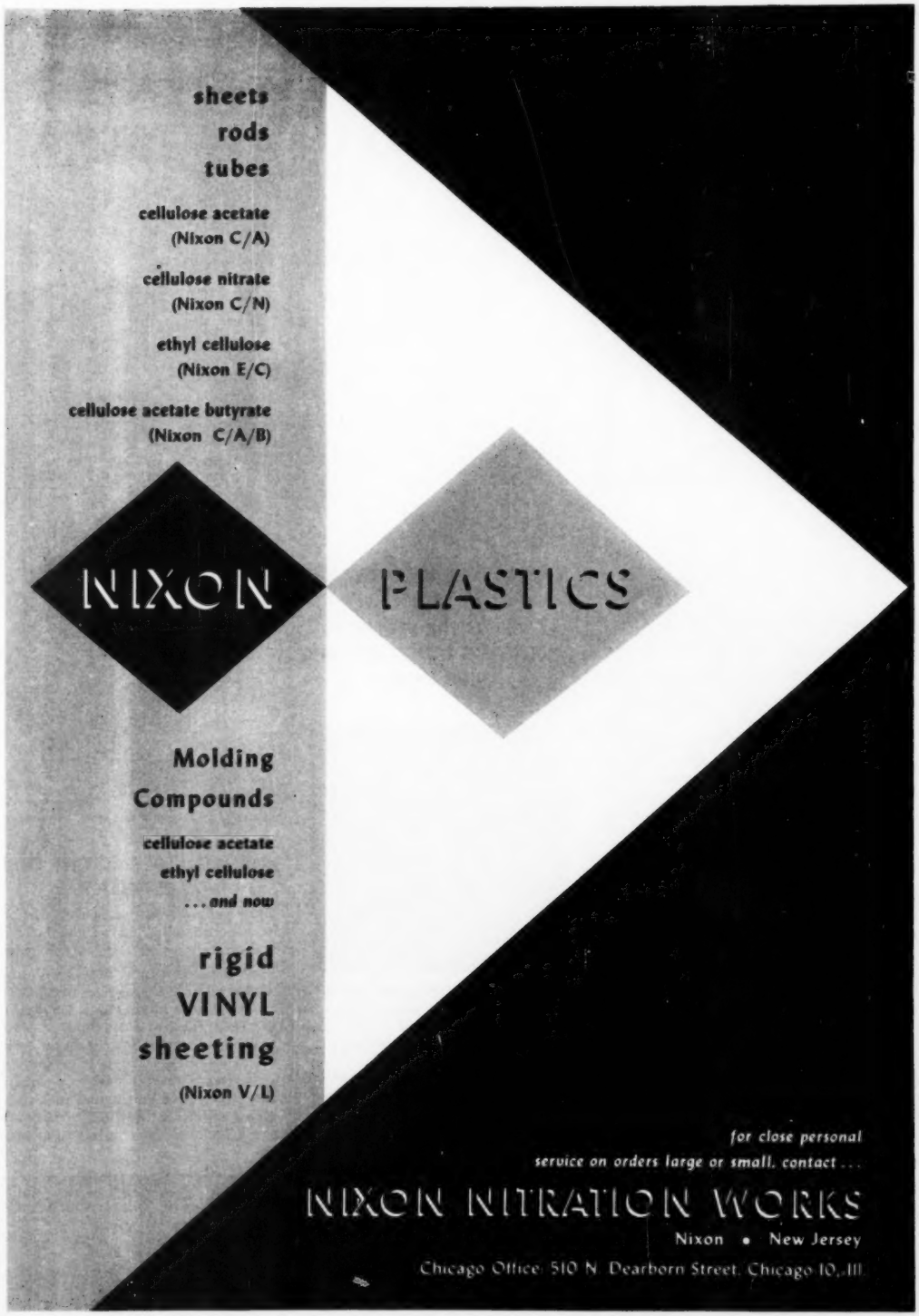
☐ *Please...all data on Stokes fully automatic molding presses.*
☐ *Parts or blueprints are attached for your analysis . . . no obligation.*

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____ DS


sheets
rods
tubes
cellulose acetate
(Nixon C/A)
cellulose nitrate
(Nixon C/N)
ethyl cellulose
(Nixon E/C)
cellulose acetate butyrate
(Nixon C/A/B)
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Compounds
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Chicago Office: 510 N. Dearborn Street, Chicago 10, Ill.

THERMOPLASTICS FILM EXTRUSION EQUIPMENT

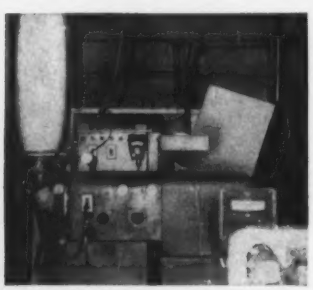
All-electrically heated extruder for producing Polyethylene film in any size

NRM

Capacity:	250-300 lbs. per hour.
Dies:	Available in various lengths up to 72".
Take-up:	Available in 48" and 72". Larger dies and take-ups can be made.
Thickness Range:	.001" — .010".
Tolerance:	Plus or minus 5%.
Features:	Compact—uses very little floor space. Light but rigid; can be moved on casters but working position is on jackscrews. Dual take-up winds wrinkle-free trimmed without ridges due to variation in thickness tolerance.

EXTRUDER FOR PRODUCING POLYVINYL CHLORIDE SHEETING BY EXPANDED TUBING METHOD

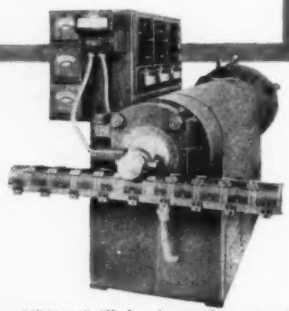
Tremendous savings are now possible through the NRM adaptation of standard extruding machines for polyvinyl chloride sheeting. NRM has perfected tubing dies and screw designs to a point where thin gauge (.002") polyvinyl chloride sheeting is obtainable in acceptable quality from a compound in powdered form.



EXTRUDERS FOR PRODUCING POLYETHYLENE FILM BY EXPANDED TUBING METHOD

Close-up view of NRM 48" dual take-up for polyethylene film.

Sizes up to 72" flat are now available. Larger sizes are available if required. Wall—.001". Close tolerance.



NRM 4½" All-electric extruder equipped with T-type polyethylene die.

.001" CELLULOSE ACETATE FILM BY EXTRUSION

Thin gauge cellulose acetate film is now being extruded with a flat die and by the expanded tubing method.

Extruders, dies, and take-up equipment available for all sizes of plastics tubing, film and sheeting. Complete details of these and other NRM plastics extruders will be sent on request. NRM engineers are at your service with over 11 years' creative engineering experience and actual manufacturing experience devoted exclusively to plastics extrusion equipment.

NATIONAL RUBBER MACHINERY CO.

General Offices & Engineering Laboratories
Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EXPORT Plastics Machinery: OMNI EXPORT CORPORATION
460 4th Ave., New York 16, N. Y.

Creative Engineering

Woman's Home Companion

AMERICAN ARTIST

FLOODS of PUBLICITY for this "PRIZE CHAIR" of...

ZENALOY*

Christian Science Monitor

N.Y. Times Magazine

LIFE

TIME

Retailing Daily

● A sensational new type of modern low-cost furniture—in a sensational new material—this prize winner in the New York Museum of Modern Art international competition has received more publicity in leading magazines and newspapers than perhaps any other plastic achievement so far.

The trade press has also hailed **ZENALOY** as the ideal answer to a multitude of preform problems.

ZENALOY replaces steel at one-fifth the weight. It is 25% lighter even than aluminum, produces complete shapes without stamping or spinning and makes possible deep-drawing parts in one single, efficient operation.

ZENALOY won't rust or warp; resists heat and cold and other climatic changes; and presents no finishing problem, since it has the same surface inside and out.

Find out NOW how much LESS it would cost or how much BETTER your product (or part) can be made in **ZENALOY**—by **ZENITH**. Write, wire or phone today!

● Charles Eames, noted industrial designer, was the originator of the chair which is to be marketed by the Herman Miller Furniture Co., New York City.

ZENITH can produce in *ZENALOY:* Furniture, Refrigerator interior insulation; Step-cans, Pails, Waste-baskets and other housewares; Torcheres and bowls for lighting fixtures; Housings, etc.

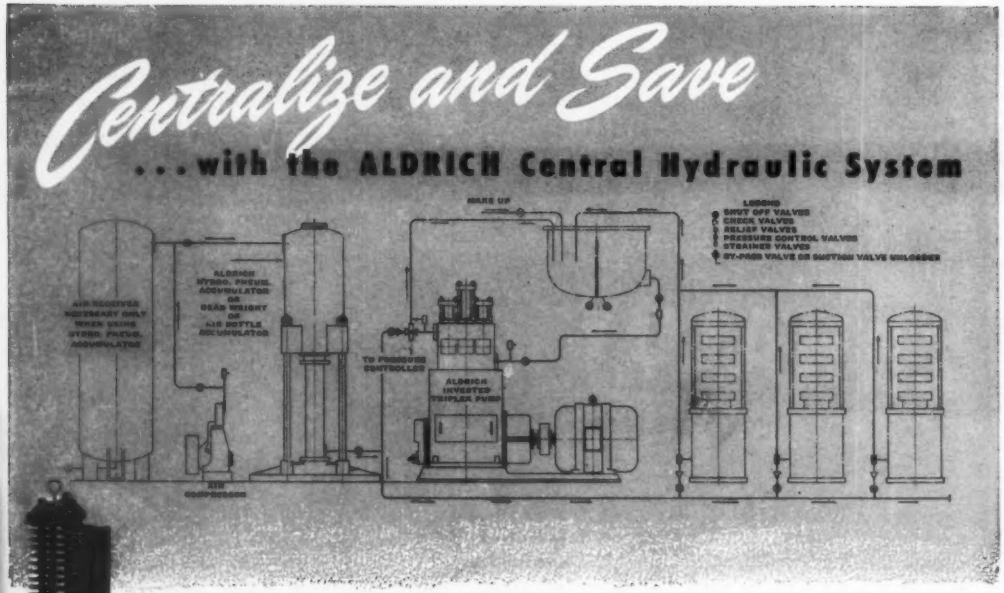
ZENITH PLASTICS CO.

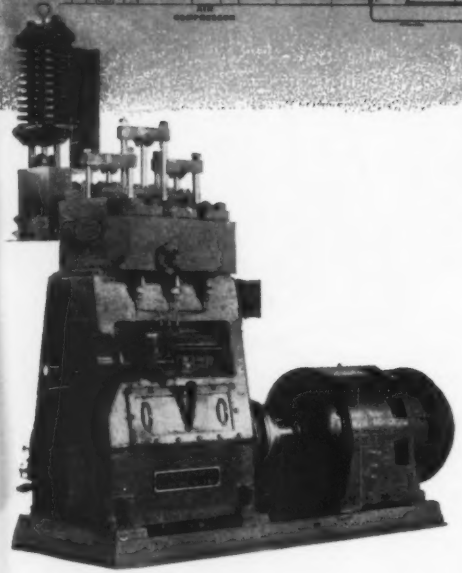
1600 W. 135th St. · Gardena, California · Plymouth 4-2934

ZENALOY* is the trade name for the Reinforced Plastic Products manufactured by ZENITH PLASTICS CO.

Centralize and Save

. . . with the ALDRICH Central Hydraulic System





The Aldrich Inverted Triplex Pump

For operation of hydraulic presses—a single, concentrated source of hydraulic power is good engineering economics. Just as a central power station most efficiently and economically serves an entire community—so can the Aldrich Central Hydraulic System serve your presses.

Centralization saves. Present Aldrich installations in plastic molding and record pressing plants prove this. You save through less waste energy, more efficient production of power, quick accessibility, minimum machinery, less maintenance and repair, less time wasted.

The heart of the Aldrich System is the Aldrich Pump. Either the Aldrich Inverted Triplex or the Aldrich-Groff "POWR-SAVR" Controllable Capacity Pump can be used. The Aldrich Inverted Triplex, a constant stroke, constant speed pump, ranges in power from 10 to 300 HP and may be coupled directly or through speed-reducers to a driver located on the floor—saving space and foundation costs. The "POWR-SAVR", a variable stroke pump, provides stepless, automatic control of delivery. And delivery is in almost direct proportion to demand—saving power.

Whatever your job may be, if you use several presses—check with our engineers on the Aldrich Central Hydraulic System.

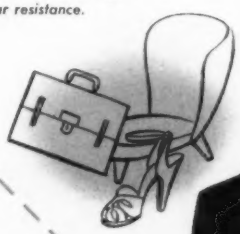
Representatives: Birmingham • Bolivar, N. Y. Boston • Chicago • Cincinnati • Cleveland Denver • Detroit • Duluth • Houston Jacksonville • Los Angeles • New York • Omaha Philadelphia • Pittsburgh • Portland, Ore. Richmond, Va. • St. Louis • San Francisco Seattle • Spokane, Wash. • Syracuse • Tulsa

THE ALDRICH PUMP COMPANY

6 GORDON STREET, ALLENTOWN, PENNSYLVANIA

The **FIRST** *Name in Reciprocating Pumps*

Marvinol-based calendered sheets have superior "dry hand" . . . are easily worked . . . have high stitch-tear resistance.

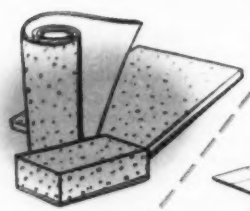


Cast, calendered or extruded Marvinol-based films have high tear strength . . . are easily processed, printed, embossed, sewn or heat-sealed.

Marvinol pays off with faster extrusion rates . . . makes end products with high resistance to cut-through, good electrical qualities.

Adaptable to injection, low pressure, compression, slush and blow molding, Marvinol gives strong, durable products with sharp detail.

Marvinol is being used in new vinyl compositions to make tough, lightweight cellular products.



Colorful, durable, high-style floor coverings are processed from high molecular weight Marvinol formulations.

FOR SUPERIOR physicals, Marvinol VR-10. For ease in processing, plus good physicals, Marvinol VR-20. Now both Marvinol resins give processors the characteristics that make sales. Stability under heat, light and time; dimensional stability; low temperature flexibility; resistance to wear, tear, oils and acids.

Let us show you how to utilize these extras in Marvinol. All technical information developed in our modern laboratories is at your disposal since it is through you that Marvinol-based products reach the consumer. Write today for the latest technical information. Dept. M-10. NAUGATUCK CHEMICAL, Naugatuck, Connecticut. *In Canada,* Naugatuck Chemical, Elmira, Ontario.

Other Products of Naugatuck Chemical:

KRALAC molding powders • VIBRIN Polyester resins • PQL chemical and heat resistant baking enamel • SHRINKMASTER process for rendering woolens shrink-resistant and long-wearing • SPERGON fungicide for seed treating • TUFOR 2-4-D weed killers • PHYGON orchard and row crop spray fungicide • SURFA-SEALZ rubber compound for surfacing highways • LOTOL compound latices, natural and synthetic • DISPERSITE water dispersions of reclaimed rubber and resins • Reclaimed Rubber • Aromatics • Synthetic Rubber • Rubber Chemicals • Raw Latex • Plasticizers

Marvinol

NAUGATUCK CHEMICAL

DIVISION OF UNITED STATES RUBBER COMPANY

The fault was in choosing the wrong type fastener . . . but

THE MOLDER WAS BLAMED

When "tough breaks" like this occur —and they happen too often in assembly with plastics parts—it's the custom molder, usually, who gets the blame. Yet, all too often, the fault lies *not* with the molding compound but with the fasteners used by the manufacturer.

Use of the wrong *type* of fastener may not only damage the molder's reputation unfairly . . . it can *wipe out* your profits, through parts spoilage and increased production costs. That's why so many good custom molders, interested in their customers' problems, get recommendations first from Parker-Kalon.

First, because Parker-Kalon makes a complete line of Self-tapping Screws —will fit the fastener to your special needs, *not* your needs to the fastener.

Second, because Parker-Kalon, originators of Self-tapping Screws, learned long ago how to keep hardness and toughness properly balanced in *every* screw—learned to maintain the uniform quality that keeps fast-moving assembly lines trouble-free. And there's no substitute for 35 years experience.

So question the efficiency of your fastening method before you blame your molder. Call in a P-K Assembly Engineer—preferably at the design stage. It will pay you—in fewer rejects, faster assembly, and help your molder serve you better. Parker-Kalon Corporation, 200 Varick St., New York 14, N. Y. Sold everywhere through accredited Distributors.

*TRADE MARKS REG. U.S. PAT. OFF.

P-K TRADE MARK

The Original

PARKER-KALON* SELF-TAPPING SCREWS

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

There's a place for you at this banquet of profitable products!

YOUR PRODUCT can join this select company of products made better, more profitable, because they're made of VINYLITE Brand Plastic flexible molding and extrusion compounds.

Here's how to go about it. Make a check list of your requirements then ask yourself these questions. Do you need:

Flexibility? VINYLITE Plastic flexible compounds are available in varying degrees of flexibility from soft and rubbery to semi-rigid. They withstand long flexing without cracking.

Attractive appearance? These materials are available in the widest possible range of color from the palest pastels to deepest colors in the spectrum.

Long wearing service? These compounds are non-fading . . . resist abrasion . . . give longer wear than any of the older elastomeric materials.

Resistance to oils, chemicals? VINYLITE Plastics are highly resistant to oils, greases, acids and alkalis.

High speed production? VINYLITE Plastic flexible compounds are easily fabricated by injection molding. They are extruded with equal facility.

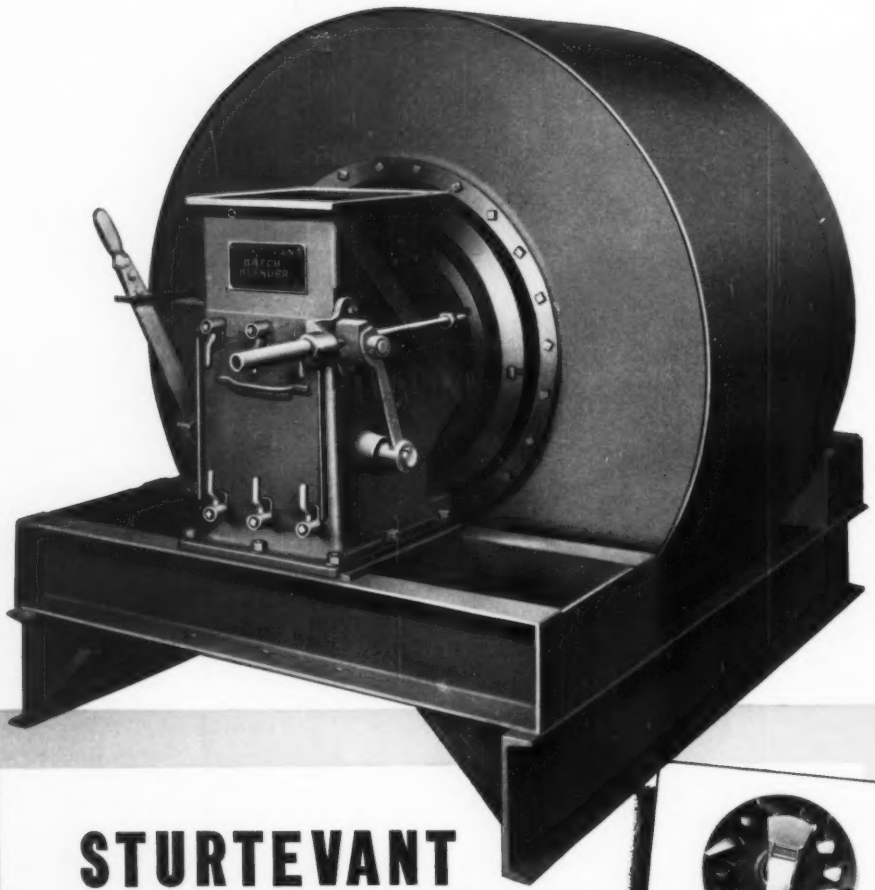
This unique combination of properties may play a big role in your future success. Drop a line to Dept. IZ-10 for further information about these versatile materials. You'll find us most cooperative in helping you work out your particular application.

Vinylite BRAND PLASTICS

BAKELITE DIVISION

UCC

BAKELITE DIVISION, *Union Carbide and Carbon Corporation*, 30 East 42nd Street, New York 17, N. Y.



STURTEVANT DUSTLESS BLENDERS

Thoroughly Blend Substances into an Inseparable Mass

The 4-Way Mixing Action of the Sturtevant Dustless Blenders thoroughly mixes two or more substances into an inseparable whole . . . every part of which is the same analysis. Single receiving and discharging opening insures tight sealing during mixing process. "Open-door" accessibility permits thorough cleaning. The fast, accurate mixing operation increases output . . . cuts mixing costs. Available in many sizes with mixing capacities from ¼ ton to 75 tons per hour. Write for information and catalog.

Receiving — The ingredients to be mixed enter the mixing chamber of drums through a chute. Note scoops which carry up and dump the ingredients as drum rotates assuring a more uniform mix.

Discharging — Throwing a lever closes the inlet and mixer is in discharging position. The completely mixed materials drop off the lifting scoops and discharge through chute without segregation of ingredients.

The Sturtevant Mill Company

110 Clayton Street, Boston 22, Massachusetts

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

ELMER E. MILLS

Blown Plastic Bottles

The finest salesmen your products can have!

STOCK BOTTLES

- Lightweight—Unbreakable—Polyethylene available with or without "squeeze" features. Bottles are available in 2-4-6-8-ounce sizes.
- In clear plastic or wide range of colors.
- Stock atomizers with stream-spray or sprinkler features.
- Stock closures and tubing.

Since we make all of these parts, we can facilitate our service to you as a single source of supply.

For more information on our custom molding service, or for a free sample stock bottle, write us or our sales agent today.

SPECIAL BOTTLES

By combining skillful craftsmanship and sound engineering, we are producing specially blown thermoplastic bottles with or without "squeeze" features and in many shapes and sizes. This Helene Pessl "LITTLE LADY" and Manon Freres "PUPPY DOG" are typical examples. We also make closures and atomizers to your special needs.

Our bottles are manufactured under Patent number 2,515,093. Other patents are pending.

ELMER E. MILLS CORPORATION
2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS

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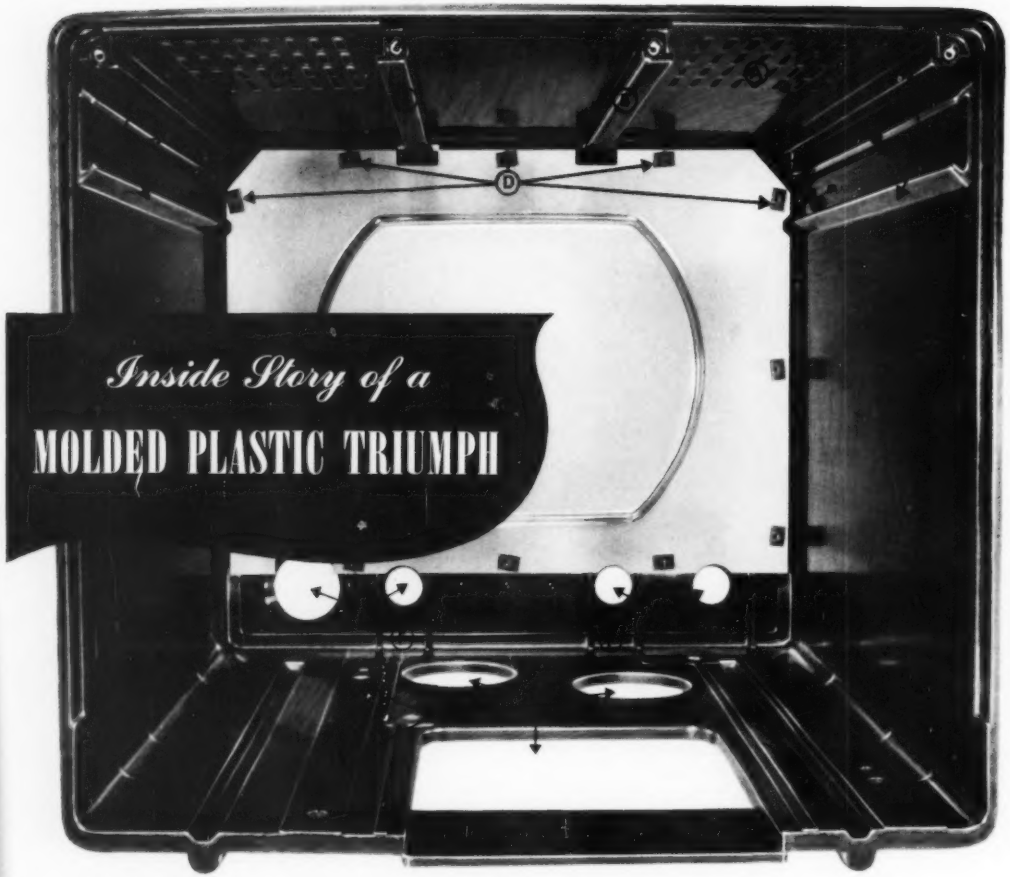

Inside Story of a MOLDED PLASTIC TRIUMPH

A. Louvred ventillating opening and speaker grille...molded in with automatically actuated side cores.
B. Assembly rails.
C. Threaded metal inserts.
D. Twelve molded-in studs hold face plate with metal fasteners.
E. Molded-in openings for face plate and controls.
F. Reinforcing ribs.
G. Eleven assembly holes and openings molded in with automatically actuated side cores.

DIMENSIONS: 18⅛ x 15⅝ x 19 inches deep.
WEIGHT: 20 lbs.

You are looking into the back of a television cabinet produced by **MPc** for RCA Victor. What you see helps to explain how RCA Victor...known for uncompromising quality...can put such a low, sales-making price tag on such a fine TV receiver.

The sleekly beautiful cabinet springs from the mold ready for assembly...complete with studs and rails, cored-in openings and molded-in metal inserts. No further costly fabrication is needed. Labor cost for assembling component parts is pared to the minimum.

This job, challenging the plastic molder's skill, was tooled at **MPc**...is now being dependably produced in quantities to satisfy RCA Victor's vast requirements.

Consult **MPc** about making plastics perform to *your* commercial advantage. Submit your plastic product or problem to Molded Products Corporation, 4535 W. Harrison St., Chicago 24, Ill.

PLASTICS DIVISION

MOLDED MPc PRODUCTS

CORPORATION

At YOUR fingertips

...on-the-spot data for your customers

FREE—Simply write, or use the convenient coupon today for your free material-cost, plastics-properties COMPARATOR, Monsanto's newest aid for custom molders.

Now you can step in at the opportune moment to help your customers select the *right material* for their jobs.

With a twist of the dials, your customers can see for themselves the relative costs of plastics and alternate materials, or the physical properties of the plastics in which they're interested. With this pocket-handy aid, you can show them the comparative cost figures on plastics and metals. Or exact data on the mechanical, thermal, optical, electrical and chemical properties of twelve leading plastics.

Scores of molders have already received the Monsanto COMPARATOR and are finding it a genuinely useful sales tool. Send for yours today. Remember, the right cost information or properties data, in your hands at the right time, may gain for you an important new friend and customer.

(Chances are, the "right material" can be found among Monsanto's big family of plastics, for Monsanto makes the broadest range of plastics in the world. If you're not now using Monsanto plastics, it will pay you to investigate the many advantages of this broad, versatile line.)

MONSANTO
CHEMICALS—PLASTICS
SERVING INDUSTRY
...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Plastics Division,
Dept. MPLP34, Springfield 2, Mass.

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☐ Please send me complete information on Monsanto Plastics.

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YOUR PLASTICS AND

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WRITE TODAY

preview issue now ready

FIRST ISSUE JANUARY 1951!

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To help you make an immediate appraisal of this important new publication that will reach 50,000 of the nation's biggest retail buyers of plastics products, a special fully-printed preview issue has been prepared. Just off the press, a free copy of it together with full details are yours for study. Write today on your business letterhead.

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122 East 42nd Street, New York 17, N. Y.

THE MOST IMPORTANT ADVANCE

IN TENSION AND COMPRESSION TESTING!

The New Olsen Hydraulic SUPER "L" Universal Testing Machine

Widest spread of capacities in one machine—0 to 60,000 lbs.; 0 to 12,000 lbs.; 0 to 1200 lbs. A 50 to 1 ratio. Additional lower ranges available.

When equipped with an Olsen Recorder, recorder load scale ranges are 100 to 1 minimum.

Selec Φ range Indicating System **with Alcotran Unit**
Choose any of the ranges at the flip of a switch. All zeros identical.

Load ranges can be changed under test.

28″ diameter dial with ultra-precision uniform graduations. All ranges are on one easy-to-read dial.

Automatic, fool-proof range indicating system for showing the range in use. Each range individually lighted.

Simplified Controls.

Larger capacities available up to 400,000 lbs.

Accuracy in all ranges within ASTM, U. S. Army, Navy, and Federal Specs.

And in addition, low cost.

Write today for complete information.

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Testing & Balancing Machines
TINIUS OLSEN
TESTING MACHINE CO.
2050 Easton Rd., Willow Grove, Pa.

GENERAL INDUSTRIES
Serves ALL Industry
with low-cost, custom molded plastics

Since 1933 . . . Pointing the way with PLASTIC

Long a favorite with motorists, the Hull automobile compass stands up under hot summer sun, sub-zero cold and constant vibration. Its attractive, streamlined housing is molded in durable phenolic by General Industries . . . has been ever since the compass was first introduced seventeen years ago.

In the record of these hundreds of thousands of compass housings molded for Hull Manufacturing Company, is another convincing demonstration of the long-term satisfaction that comes from doing business with GI —one of America's foremost custom molders of top-quality plastics.

Whatever the direction in which your product is heading—increased sales appeal, improved design or lower cost —you'll be on the right course when you bring your plastics molding requirements to General Industries. Extensive modern facilities for compression and injection molding, backed by 30 years of plastics molding "know how", are ready to go to work for you. Write, wire or phone *today*.

FREE 16-page booklet, "Your Product in Plastics" describes General Industries extensive, modern molding and finishing facilities. Send for your copy today.

The GENERAL INDUSTRIES Co.

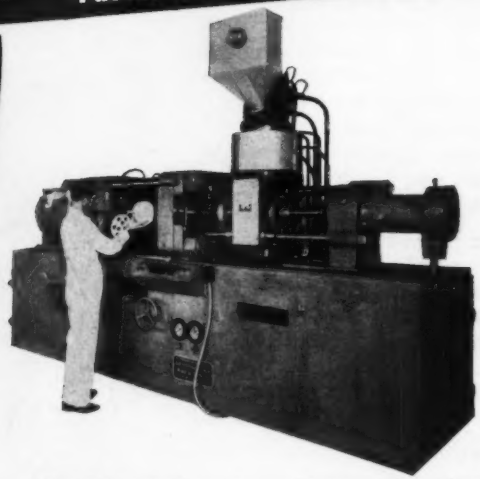
DEPARTMENT R • ELYRIA, OHIO

Now! 9 and 16 ounce H-P-M Injection Molding Machines can be Converted to "PRE-PLASTICIZING"

Doubled "Shot" Capacity

Plasticizing Capacity More Than Tripled

Faster Production Cycles



SPECIFICATIONS

Injection machine to be converted	9 Oz.	16 Oz.
Pre-plasticizing Unit—Model No.	CP-20	CP-32
Material injected per cycle at 15,000 psi Polystrene	20 Oz.	32 Oz.
Material Injected per shot (Cu. In.) Max.	58	85
Rate of Injection (Cu. In. per minute)	880	1070
Plasticizing capacity (Lbs. per hour) Polystyrene	200*	200*
Injection Pressure on Material (Max.) psi	15,000	15,000

*Plasticizing capacity rated upon continuous feeding of molding material into pre-plasticizing chamber. Actual amount of material plasticized depends upon duration of plunger "in" time at which time feed plunger is inoperative.

Here is important news to present owners of 9 and 16 ounce H-P-M's . . . a conversion unit that will more than double your present "shot" capacity. And in addition, plasticizing capacity will be increased 3 to 4 times! Pre-plasticizing puts the material in the injection chamber in a liquid state, reducing the need for high pressure injection except when restricted gating is employed. You'll get more effective use of mold mounting space. No longer does plasticizing capacity need to limit your cycle time . . . add it all up and the net result to you is more parts per hour. There's far less chance for material discoloration or burning than with conventional heat cylinders.

This H-P-M "Pre-plasticizer" is a "packaged" unit, easily installed on your present H-P-M to give you these superior operating features. This same pre-plasticizing unit is available on new 250 and 350 ton clamp machines. Write for complete specifications.

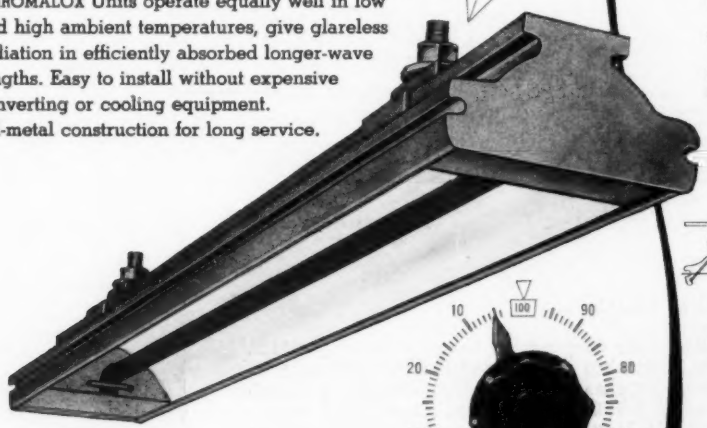
THE HYDRAULIC PRESS HPM MANUFACTURING COMPANY

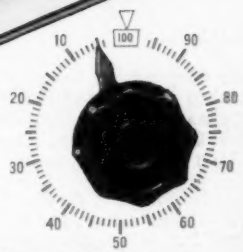
1010 Marion Road Mount Gilead, Ohio U. S. A.

Uniform, EXACT *infrared heat*

at the **turn** of a dial

You can "dial" the exact uniform heat you need to fit the job in infrared drying, baking, preheating, curing, dehydrating and similar applications when you use CHROMALOX Electric Radiant Heaters. Compact CHROMALOX Units operate equally well in low and high ambient temperatures, give glareless radiation in efficiently absorbed longer-wave lengths. Easy to install without expensive converting or cooling equipment. All-metal construction for long service.





CHROMALOX Radiant Heaters

trouble-free — All-metal unit withstands shock, vibration, dust, blows and rough handling. Not affected by splashed liquids; nothing to shatter.

flexible heat — Precise temperatures at the turn of a dial, easily regulated for changed working requirements. Ovens can be zoned for stepped-down heat.

color-blind — Chromalox Radiant Heat ignores color variations; longer-wave length infrared is absorbed equally by all colors, textures, surfaces.

uniform heating — Light, dark or multicolored work may be processed simultaneously. Proper heater positioning assures an even blanket of heat without hot-spots.

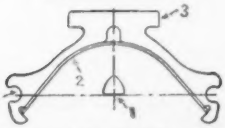
CHROMALOX

Electric heat for modern industry

Only **Chromalox** Radiant Heaters offer these features

•

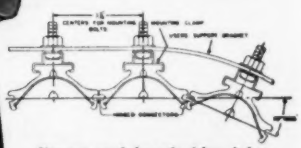
ALL-METAL DESIGN



1. Inconel-sheathed Chromalox triangular heating element.
2. Highly polished, non-oxidizing reflector.
3. Rigid, extruded metal housing.
4. Interlocking connector for assembling banks of heaters.

•

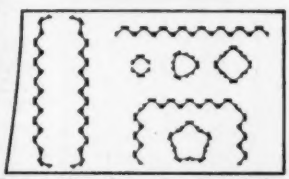
QUICK, EASY INSTALLATION



Clamps and interlocking joints simplify assembly of units into ovens, banks, tunnels, etc.

•

VERSATILE APPLICATION



Cross-section views of a few of the many oven designs possible with Chromalox Radiant Heaters.

For more Know-How—
Send for complete Application File

It shows you how many others are saving time, and increasing production with Chromalox Radiant Heaters.

IC-48

EDWIN L. WIEGAND CO.
7503 Thomas Boulevard
Pittsburgh 8, Pa.

Yes . . . send me the application file on Chromalox Radiant Heaters

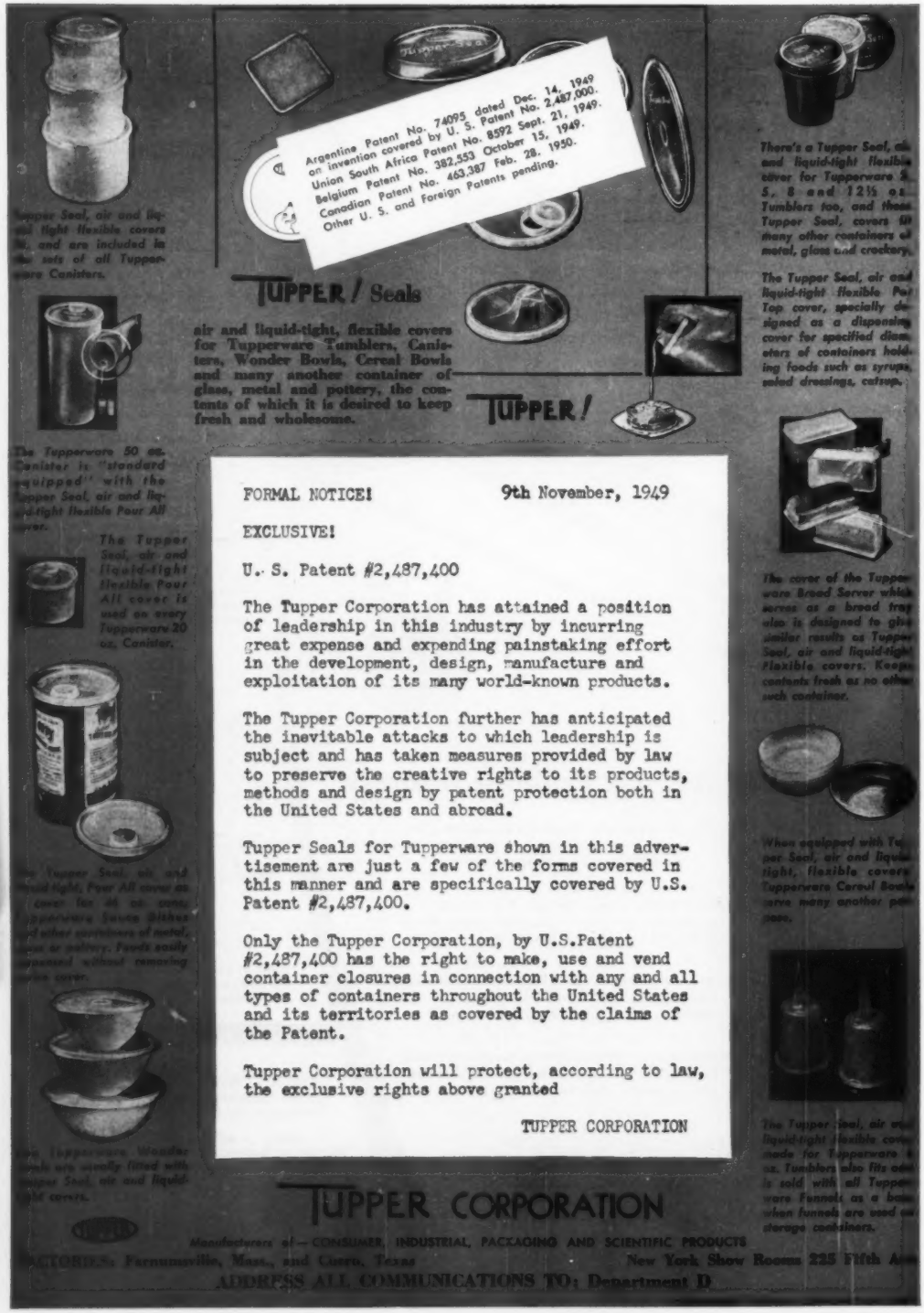
Name_____

Company_____

Street_____

City_____ Zone____

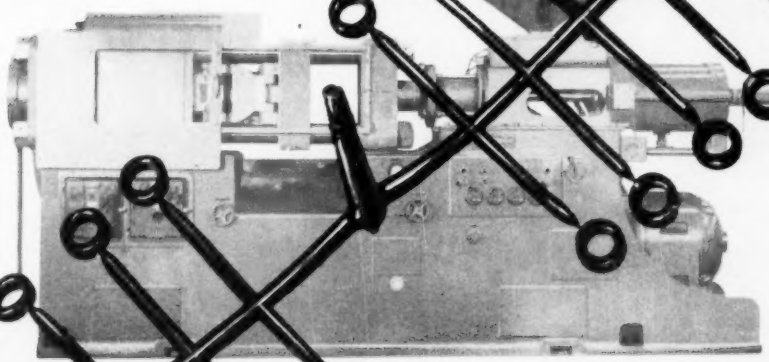
State_____


Argentine Patent No. 74095 dated Dec. 14, 1949
on invention covered by U. S. Patent No. 2,487,000.
Union South Africa Patent No. 8592 Sept. 21, 1949.
Belgium Patent No. 482,553 October 15, 1950.
Canadian Patent No. 463,387 Feb. 28, 1950.
Other U. S. and Foreign Patents pending.
TUPPER / Seals
air and liquid-tight, flexible covers for Tupperware Tumblers, Canisters, Wonder Bowls, Cereal Bowls and many another container of glass, metal and pottery, the contents of which it is desired to keep fresh and wholesome.
TUPPER /
There's a Tupper Seal, air and liquid-tight flexible cover for Tupperware 2, 5, 8 and 12½ oz. Tumblers too, and these Tupper Seal, covers fit many other containers of metal, glass and crockery.
The Tupper Seal, air and liquid-tight flexible Pour Top cover, specially designed as a dispensing cover for specified diameters of containers holding foods such as syrups, salad dressings, catsup.
The cover of the Tupperware Bread Server which serves as a bread tray also is designed to give similar results as Tupper Seal, air and liquid-tight Flexible covers. Keeps contents fresh as no other such container.
When equipped with Tupper Seal, air and liquid-tight, flexible covers Tupperware Cereal Bowls serve many another purpose.
The Tupper Seal, air and liquid-tight flexible cover made for Tupperware 4 oz. Tumblers also fits each is sold with all Tupperware Funnels as a base when funnels are used as storage containers.
The Tupperware 50 oz. Canister is "standard equipped" with the Tupper Seal, air and liquid-tight flexible Pour All cover.
The Tupper Seal, air and liquid-tight flexible Pour All cover is used on every Tupperware 20 oz. Canister.
The Tupper Seal, air and liquid-tight, Pour All cover as a cover for all or some Tupperware Sauce Dishes and other containers of metal, glass or pottery. Foods easily dispensed without removing entire cover.
The Tupperware Wonder Bowls are usually fitted with Tupper Seal, air and liquid-tight covers.
FORMAL NOTICE! 9th November, 1949
EXCLUSIVE!
U. S. Patent #2,487,400
The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.
The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.
Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.
Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.
Tupper Corporation will protect, according to law, the exclusive rights above granted
TUPPER CORPORATION
TUPPER
Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS
FACTORIES: Farnumsville, Mass., and Cisco, Texas New York Show Rooms 225 Fifth Ave.
ADDRESS ALL COMMUNICATIONS TO: Department D

Want a 27% Boost in Production*?

F-L Molding Machines Set the Pace in 8-ounce Shots, Too!

*Average production increase based on 5 actual runs (on different objects) on the new design F-L 5C-8 as compared with other equivalent size injection molding machines



Here is production capacity and ease of operation never before available in a machine of this class. The many advanced features of the new design F-L 5C-8 are worthy of consideration by every production molder.

Greater plasticizing capacity, up to 80 pounds per hour, through the fast-heat 'Speed-Flo' cylinder; more cycles per hour, up to 340 (dry run), with the rapid advance injection plunger. Add to these the many other exclusive Fellows design features and you have a machine investment that's hard to beat. Arrangements can be made to see this pace-setter in operation. Contact the Fellows office nearest you.

Fellows LEOMINSTER

injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 616 Fisher Bldg., Detroit 2. 640 West Town Office Bldg., Chicago 12 • 2206 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.

Today, much of the custom molder's business is precision work. His place in industry's confidence is determined by

experience, progressiveness, price dependability and by quality...in the fullest meaning of the word

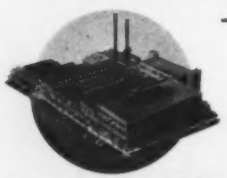
—Consolidated's "S.Q.C." Statistical Quality Control Insures Quality Production!

The parts we mold are truly counterparts of each other, because we police production with Statistical Quality Control. This system of scientific sampling trues output to the specifications set down for it—and saves money by sparing the customer any need for post delivery inspections.

Since 1874, Consolidated has practiced high quality custom molding. As of today, therefor, we can advantageously counsel on product design, determine the right material, produce the proper mold, and deliver the most desirable and most economical method of production. Your inquiry to our nearest or home office is invited!

Please Address Dept. G-10

Precision Follow Thru of Specified Requirements Eliminates Customer's Inspection —Saves Money!



A Million Dollars in Custom Molding Facilities to Guarantee "Your Blueprint in Plastic"... with Savings!

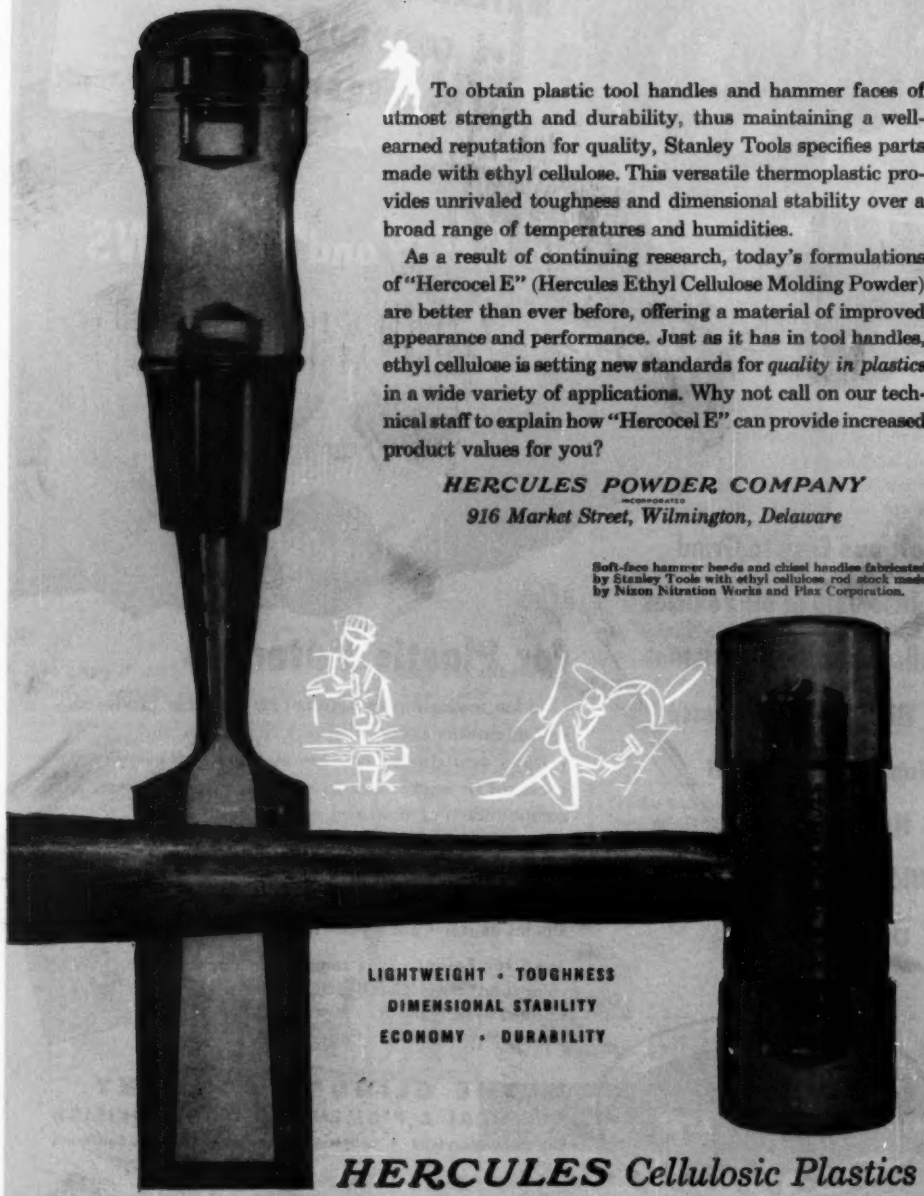
CMP

Consolidated *Molded Products Corporation*

Plant & Executive Offices: 309 CHERRY ST., SCRANTON 2, PA.

Branch Offices and Representatives in New York, Chicago, Detroit, Cleveland, Bridgeport, Philadelphia—*and other principal cities*

Stanley + Ethyl = Quality



To obtain plastic tool handles and hammer faces of utmost strength and durability, thus maintaining a well-earned reputation for quality, Stanley Tools specifies parts made with ethyl cellulose. This versatile thermoplastic provides unrivaled toughness and dimensional stability over a broad range of temperatures and humidities.

As a result of continuing research, today's formulations of "Hercocel E" (Hercules Ethyl Cellulose Molding Powder) are better than ever before, offering a material of improved appearance and performance. Just as it has in tool handles, ethyl cellulose is setting new standards for *quality in plastics* in a wide variety of applications. Why not call on our technical staff to explain how "Hercocel E" can provide increased product values for you?

HERCULES POWDER COMPANY
INCORPORATED
916 Market Street, Wilmington, Delaware

Soft-face hammer heads and chisel handles fabricated by Stanley Tools with ethyl cellulose rod stock made by Nixon Nitration Works and Plax Corporation.

LIGHTWEIGHT • TOUGHNESS
DIMENSIONAL STABILITY
ECONOMY • DURABILITY

***HERCULES** Cellulosic Plastics*

"HERCOCEL E" IS A HERCULES TRADEMARK

CP50-7

- Soft and Easy to Grind
- Insoluble in Oil Vehicles
- Alkali and Acid Resistant
- High Heat Resistance
- Non-Fading to Light
- Non-Bleeding
- Wide Range of Shades
- Opaque

for Plastic Materials

Glidden leadership in pigment research has produced in Cadmolith* Colors the very finest reds and yellows available anywhere—measured by every standard of importance to material manufacturers, compounders of new and old materials and plastic molders and coaters. Where a higher degree of opacity is required, *Pure* Cadmium Reds are available in the same broad range of shades as our Cadmolith* Reds.

Send for Folder giving complete details, with color chips. Write The Glidden Company, Chemical and Pigment Company Division, Union Commerce Bldg., Cleveland 14, Ohio.

QUALITY Glidden PRODUCTS

THE GLIDDEN COMPANY
CHEMICAL & PIGMENT COMPANY DIVISION
Baltimore, Maryland • Collinsville, Illinois • Oakland, California

"no more GAMBLING on tool steel selection"

[⅓ actual size; Selector is in 3 colors]

Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of *picking the right tool steel right from the start* is going over big.

"Handiest selector I've ever seen"

"No more gambling on tool steel selection"

"You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SELECTOR. It uses the only logical method of tool steel selection—begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

Write for your Selector today! We want you to have it, because we know you've never seen anything that approaches your tool steel problems so simply and logically. Just fill out the coupon and mail. Act now! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!

And you're sure you're right!!

Crucible Steel Company of America
Dept. MO, Chrysler Building
New York 17, N. Y.

Gentlemen:

Sure! I want my CRUCIBLE TOOL STEEL SELECTOR!

Name _____ Title _____

Company _____

Street _____

City _____ State _____

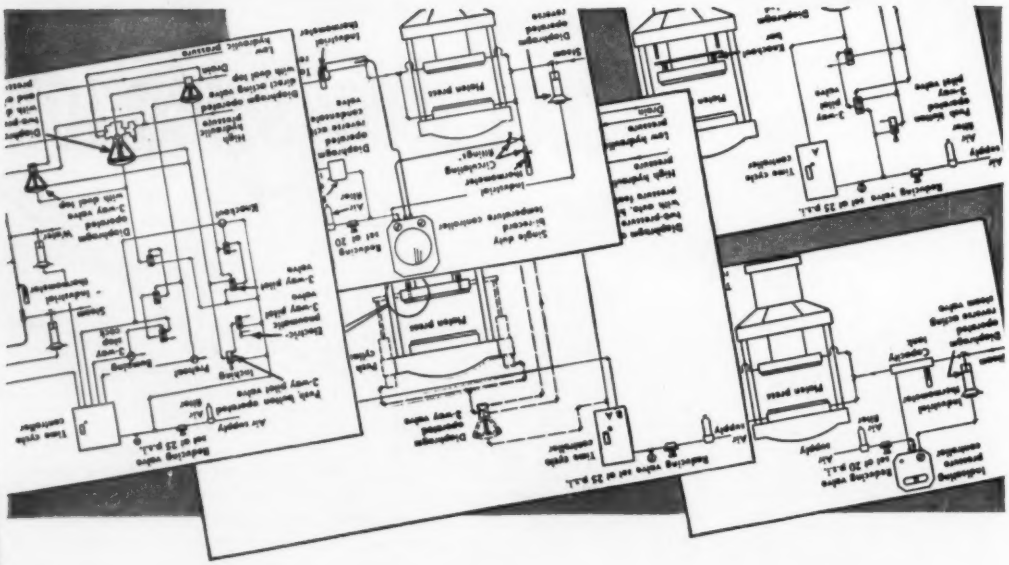
CRUCIBLE first name in special purpose steels

TOOL STEELS

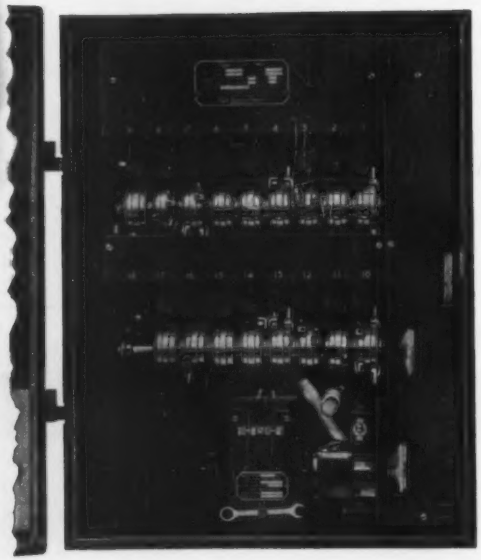
fifty years of Fine steelmaking

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

SAVE MONEY



AUTOMATIC



Taylor's New Flex-O-Timer* Time Cycle Controllers Have Been Re-designed for Greater Flexibility to slash your compression molding costs to the absolute minimum. At the push of a start button, your press will operate automatically. Your operator will have no responsibility for uniform quality and *he'll be free for other important duties.* Four big FLEX-O-TIMER Controller advantages are:

1 Greater Flexibility. Wide range of cycle bands from 14 seconds to 540 minutes meet all time cycle controller requirements.

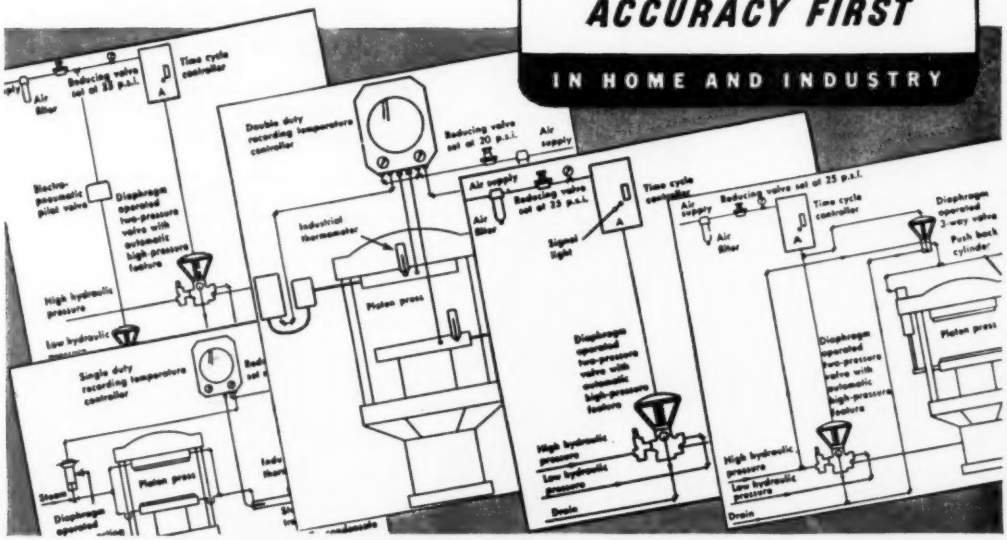
2 Newly Designed, Segmented Drum. Individual aluminum segments on a central shaft — one segment for each control function. Each function can be operated 15 times. Interchangeable drum assemblies.

3 Easy-to-Reach Unit Parts. Universal dust-tight case has hinged door with bayonet-action latch. Terminal strips, air valves and switches, snap-operators, cycle drum, solenoid motor, gear train easily removed for repair or replacement.

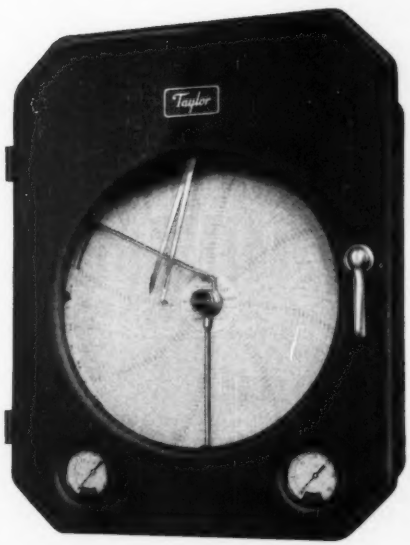
4 Easier, Simpler Adjustments. Actuating pins of precision die-cast aluminum — easy to remove and set.

WITH

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY



INSTRUMENTS



Taylor's Fulscope* Recording Controllers Are Built to Master Your Toughest Temperature or Pressure Control Problems. Maintain ideal platen temperature by controlling the inlet steam temperature or pressure, or the condensate temperature. Different platen temperatures for different products easily and quickly obtainable by merely turning an adjusting knob to set control point. Control mechanism adaptable to simplest or most complex control problem by simple addition or subtraction of pre-calibrated unit assemblies to give desired control effect. For any compression-molded product from small batch to long continuous run, you can depend on Taylor FULSCOPE Recording Temperature Controllers to hold the precise temperatures required throughout the process.

For Full Details on Taylor Flex-O-Timer Time Cycle Controllers and Taylor Fulscope Temperature Controllers, *ask your Taylor Field Engineer.* He'll save you money for many years to come. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

*Reg. Trade-Mark

Frost Scraper for Home Freezers

ANOTHER PRODUCT IMPROVED WITH PLASTIC

The combination of stainless steel and plastic produces a frost scraper for COLD SPOT HOME FREEZERS that is durable, light in weight and economical.

The steel blade, molded securely into the unit, provides the cutting edge while the plastic body insulates the user's hand from the intense cold. Permanent color and smooth lines give this household utility item added appeal.

An example of improving a product with plastic through expert design, sound engineering and quality molding.

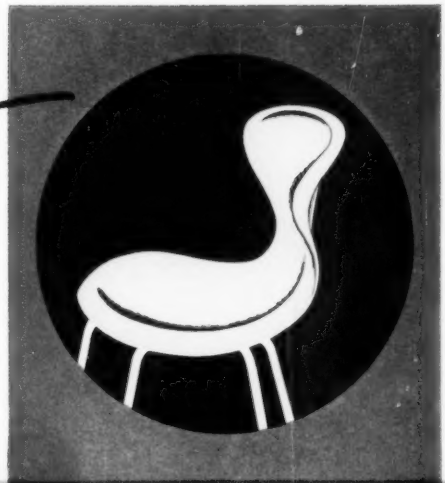
INJECTION MOLDING
MINCOR
"YOUR PLASTICS DEPARTMENT"

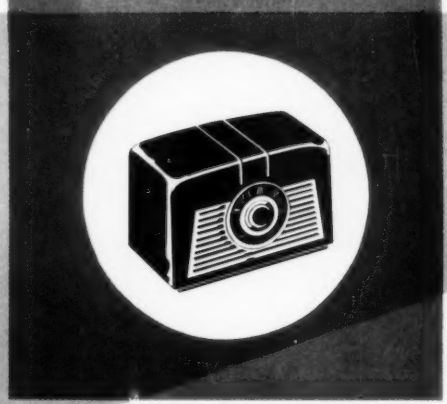
MINNESOTA PLASTICS CORP.

366 WACOUTA • ST. PAUL 1, MINN.

Colors

to tug at pursestrings





Ferro inorganic colorants move plastic products over retail counters! With them, you obtain—consistently—the subtle and harmonious colors needed to present your products to best advantage.

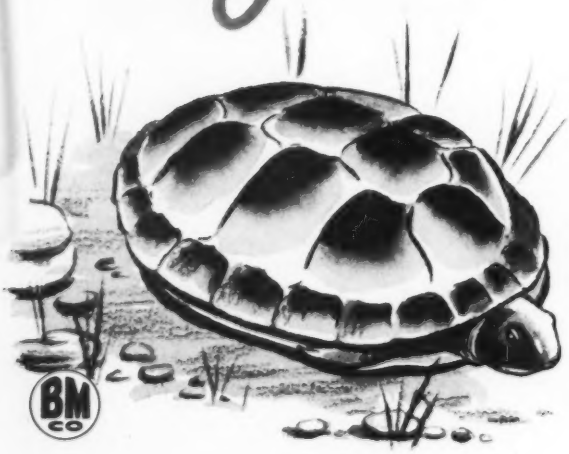
You get other advantages, too. Ferro pigments are stable, light-fast, electrical and chemical resistant; are unaffected by weather extremes. They are nonbleeding, nonmigrating, have low bulking value, and are easy to work.

Ferro dry colors are specially formulated for use in polystyrene, polyethylene, polyesters, and plastisols. For our latest Color Chart—or for help in solving a specific color problem, write Ferro today.

FERRO ENAMEL CORPORATION • COLOR DIVISION
4150 EAST 56th ST. CLEVELAND 5, OHIO

In Canada, write Ferro Enamels (Canada) Ltd., Oakville, Ontario. Associate Ferro Companies in Argentina, Australia, Brazil, England, France, Mexico, Union of South Africa, and Holland.

there he goes again!



It's a peculiar thing, how some persons react to trouble. As recent as a month ago, some manufacturers have crawled back into their shells, held back on sales reorganization, suspended all product improvement plans.

Why? Their explanation is that they're not going to spend any money "till this situation is over". They always have had an explanation for holding back and weakening their sales position . . . "wait until this labor mess is over" . . . or . . . "wait and see whether or not this country is heading into another depression".

Where is their reasoning, their logic, their good business sense? It's like going home and beating your wife because somebody grabbed your seat in a bus. It just doesn't make sense.

Regardless of fire, famine or flood . . . a manufacturing firm's success depends upon three basic tenets; 1) Soundly designed product, 2) Efficient production, 3) Adequate sales volume.

If you plan to stay in business, if deep in your heart, you know that you'll be in business next year and ten years from now, and realize that effort must be exerted every month of the year to strengthen your product's competitive position . . . we here at Boonton would welcome the opportunity of working with you and your organization.

We have had over 30 successful years of varied experience in the plastics molding industry. In that period we have been instrumental in gaining competitive victory for products in a wide range of consumer and industrial fields.

If you are not yet completely entrenched in your shell, we would like very much to talk with you. Write or wire today. There is no obligation of course.

BOONTON MOLDING CO.

BOONTON, NEW JERSEY

N. Y. Office—Chanin Bldg., 122 East 42nd Street, Murray Hill 6-8540

Approval is Growing

FOR NEW TYPE LUMARITH* *ACETATE* SHEET

Look into the cost and production advantages of the new type Lumarith *acetate* sheet . . . learn why Lumarith is now being used in all these (and many more) famous trademarked products.

Here are Lumarith features you should know about:

- **LOW COST,** substantially less than comparable material
- **WIDER RANGE** of sizes, gauges, colors
- **LARGE INVENTORY** of stock items for immediate delivery
- **BETTER SURFACE BRILLIANCE** and color permanence
- **EXCELLENT GAUGE CONTROL**
- **NON-FLAMMABLE,** safe storage and handling
- **3% MORE SHEET AREA PER POUND THAN NITRATE**
- **EASY TO FABRICATE**—blank, score, draw, cement
- **PLATE POLISH** after printing—with new inks

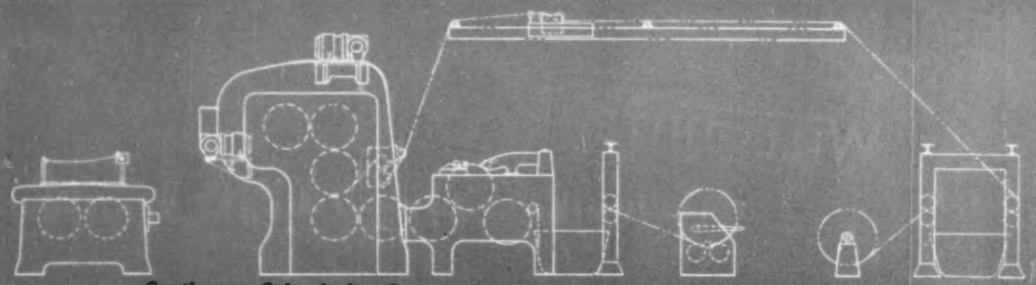
Before you buy any other material, see your Celanese representative or your nearest Lumarith jobber. He will give you more facts about Lumarith . . . answer your specific questions, and quote prices that will mean real savings. Celanese Corporation of America, Plastics Division, Dept. 1-J, 180 Madison Avenue, New York 16. In Canada: Canadian Cellulose Products, Ltd., Montreal and Toronto.

Celanese*

*Reg. U.S. Pat. Off. PLASTICS

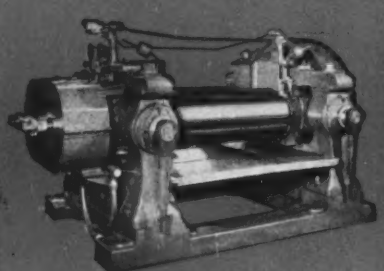
Continuous Processes

FOR RUBBER AND PLASTICS

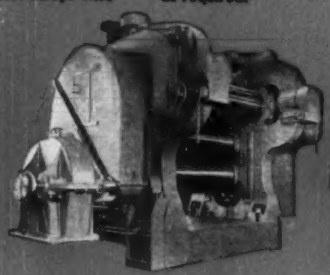


Continuous Calendering Process for Supported or Unsupported Plastic Sheet.

Equipment includes fabric let-off-stand with accumulator scray, fabric centering device, fabric pre-heating rolls, four-roll Calender, cooling rolls, and fabric wind-up with accumulator scray. Also included are facilities for trimming and winding up unsupported sheet. A stock warming up Mill is included, with stock transfer feeding conveyors as required.

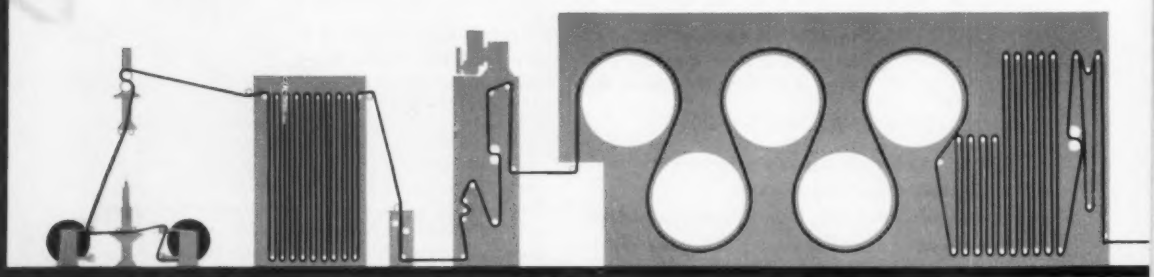


Warming and mixing Mill for plastics, 22" and 22" x 60", equipped with oil feed lubrication system, high pressure rotary joints, and tilttable stock guides.



Four-roll Calender for plastics, 24" x 68", including oil feed lubrication system, bored rolls, adjustable stock guides, high pressure rotary joints, motorized two-speed roll adjustment, and hydraulic roll stabilizing equipment.

Film and Fabric Cooling Roll Unit, with film trimming and wind-up device for mounting at the Calender.

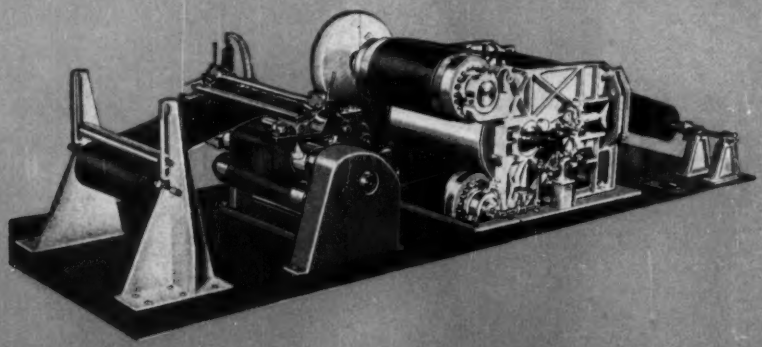


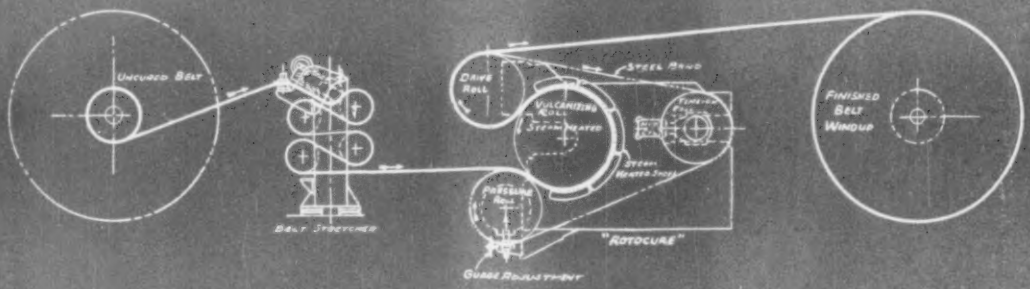
Continuous Tire Fabric Processing Unit.

This double coating train includes pre-dipping, drying, calendering, cooling, and wind-up equipment.

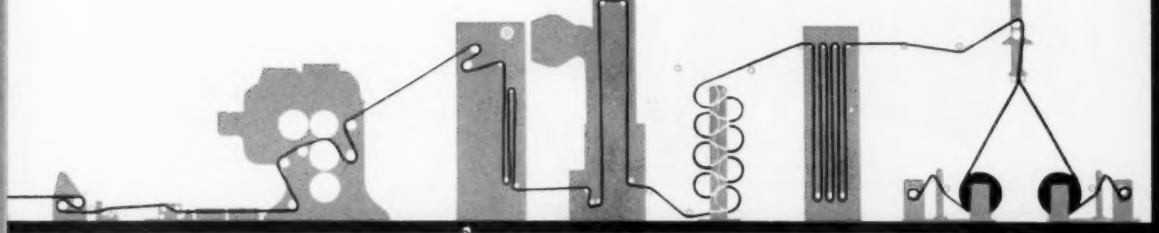
We engineer, build and install continuous processing equipment for the manufacturer of rubber or plastics products. Your inquiry concerning special or unusual requirements is invited. Our engineers are available for consultation.

Improve product quality–lower product cost





"ROTOCURE" Process for Continuous Vulcanization of Belting and Floor Matting.
The stretcher is not used when running matting. Built under license from Boston Woven Hose & Rubber Company.



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ERIE RESISTOR'S

great modern facilities and proven know-how mean better molded plastic parts for you

BIG JOBS from BIG PRESSES

• Two huge injection molding presses, each capable of molding 80 ounces of polystyrene, supplemented by a new 48 ounce press, enable Erie Resistor to mold the largest pieces ever shaped by the injection molding process. And, through the use of multiple dies, they speed production of smaller parts.

Erie Resistor, pioneer in custom injection molding, has long enjoyed a reputation for taking up where others leave off, for an ingenuity in finding ways of doing what others said couldn't be done. With expanded facilities Erie's know-how will have even greater opportunity to serve you.

One of a series of advertisements describing Erie Resistor's complete facilities for quality custom molded plastics.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND . . . TORONTO, CANADA

Case, case cover, vent plugs, and retainer mats of this 100 amp. hr., three-cell battery are molded from Koppers Polystyrene 8X. Manufacturer: C & D Batteries, Inc., Conshohocken, Pa. Molder: Mack Molding Co., Inc., Arlington, Vermont.

Moldability—

a good reason for changing to

KOPPERS POLYSTYRENE

LOWER molding costs and a better product—you can have them both when you take advantage of the improved moldability of Koppers Polystyrene.

Fewer weld lines . . . improved strain pattern . . . more uniform plasticizing of material in cylinder . . . faster cycles resulting from setting at higher temperatures . . . more uniform cylinder feed . . . all are the result of the excellent molding characteristics of Koppers Polystyrene.

Improved moldability is only one of *the unique properties of Koppers Polystyrene* that *have helped make many products better and many better products possible.*

You'll be interested in additional technical data on the molding characteristics of Koppers Polystyrenes. Koppers Technical Service Report Number 3 gives you valuable information on the moldability of Koppers Polystyrene, based on actual field experience. Mail the coupon for your copy.

KOPPERS POLYSTYRENE
gives you all these advantages

- Low cost
- Light weight—more pieces per pound
- Excellent dimensional stability
- Excellent electrical properties
- Heat-distortion temperature range: 165°-204° F.
- Good chemical and moisture resistance
- Tasteless and odorless
- Unlimited color range

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Chemical Division Pittsburgh 19, Pa.
Regional offices: New York, Boston, Philadelphia, Chicago, Detroit and Los Angeles

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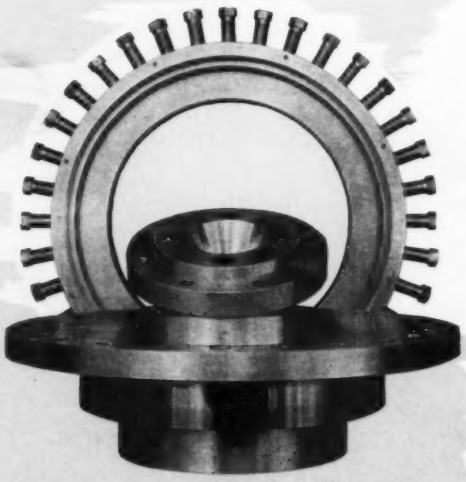
Hot Rolled Alloy Plate

1 PURCHASING AGENT — Benefits from its availability (plates up to 72" wide and 6" thick) and the fact that it can be purchased flame cut to specified dimensions on a net weight basis, for rectangular plate necessary, making his job easier. Speed Alloy — newest of the SPEED STEELS — is economical from every angle.

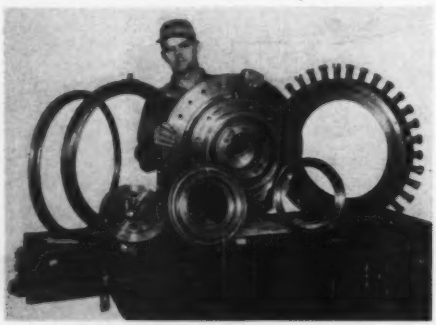
2 TOOL & DIE MAKER—Benefits because Speed Alloy is easy to machine—as easy as any machinery steel—and he can get more work done faster. Tool life is longer. Less finishing time is required. Speed Alloy heat treats uniformly and holds its dimensions to extremely close tolerances. Can be welded when necessary.

3 DIE SHOP REPRESENTATIVE—Benefits because he is assured of pleased customers—"Time Saver" Speed Alloy provides economies that enables him to bid lower. Not a kick in a car load. Speed Alloy bridges the gap between carbon and tool steels. Its chromium and molybdenum content qualify it for tough jobs.

4 TOOL AND DIE SHOP'S CUSTOMER—Benefits by faster delivery (because of savings in machining time) lower costs, and quality moldings with fewer rejects.



Indiana Foundry, Machine & Supply Co., Brazil, Ind., made the plastic extruding die above, using all three grades of Speed Steel plates, for General Plastics Corp., Marion, Ind., to extrude Tenite sheets 40" wide in thickness from .010 to .060. Different thicknesses are obtained by merely changing the outside die ring. Complete die weighs 2000 lbs. Get the facts—Bulletin 905.



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Plants: Hammond and Indianapolis, Indiana

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Continental's modern plant at Cambridge, Ohio has the equipment, the manpower and the experience to handle your toughest molding job—and give you the accuracy, quality and service you want.

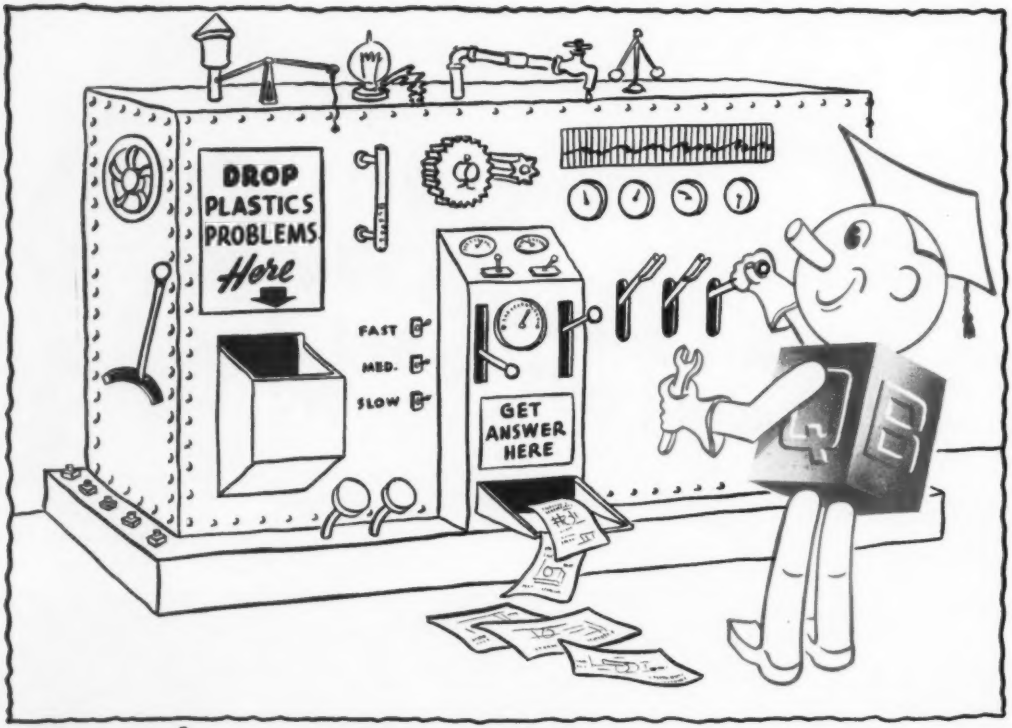
No matter how large or small your operation, or whether the part you want is for a toy train or is top secret, Continental can supply you with precision-molded parts you can depend on. Our plant is equipped with the latest and best in compression, transfer and injection molding equipment.

You'll find it pays to call on Continental. Many of America's leading manufacturers agree—*you can't beat Continental as a dependable source of supply!*

CONTINENTAL CAN COMPANY

Plastics Division

CAMBRIDGE, OHIO



It isn't as easy as this... BUT "CUBEE"

GETS THE ANSWER TO YOUR PLASTICS PROBLEMS!

Nope it isn't that easy—it takes lots of planning and designing and figuring before most problems are solved. But we've enjoyed great success at satisfying our clients just the same.

We know that, in order to help you, with your problems, we must have knowledge of materials, design, die-making, production and all the rest. We have those facilities—all under one roof—you see we're specialists in molding plastics parts—from design to finished product.

Call "Cubee" the next time you have a problem in design. We think we can help you.

Q-B Says:

"When you're planning in Plastics
And you want the very best
Give your problems to "Cubee"
And we'll do the rest".

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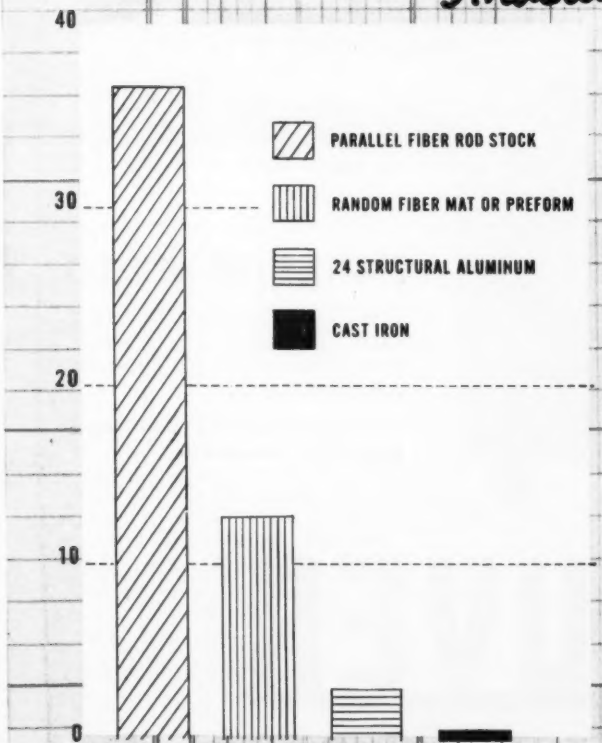
FIBERGLAS* REINFORCEMENTS + PLASTICS = PROFITS

Pound for pound... FIBERGLAS reinforced plastics are the strongest structural materials known!



Yes, there's no other material known, including aluminum and steel, that can surpass the structural strength of plastics reinforced with Fiberglas materials.

That's why molders are using Fiberglas reinforcements to make a host of products, such as:

Dish and Clothes Washing Machine Parts • Musical Instrument Cases • Protective Helmets • Luggage • Boxes and Tote Trays for Meat and Bread Delivery • Boats • Fishing Rods.

Fiberglas reinforcements open new markets for high-volume functional parts unattainable with conventional plastics—mean *increased sales, greater profits* for the molder!

Investigate these new engineering materials and cost-saving techniques for your products. Write Owens-Corning Fiberglas Corporation, Plastics Reinforcement Division, Dept. 876, Nicholas Bldg., Toledo 1, Ohio.

OWENS-CORNING
FIBERGLAS

SPECIFIC IMPACT

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

FIBERGLAS IS IN YOUR LIFE . . . FOR GOOD!

PLASTICS FOR INDUSTRY

The large polystyrene casting illustrated above is used in the ADMIRAL CORPORATION'S 12-1/2 inch television console model.

The piece is molded in a 40 ounce press and is decorated in gold.

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MANUFACTURING CO.

2460 W. JACKSON BLVD., CHICAGO 12, ILL.

BRANCH OFFICES

DETROIT MINNEAPOLIS NEW YORK

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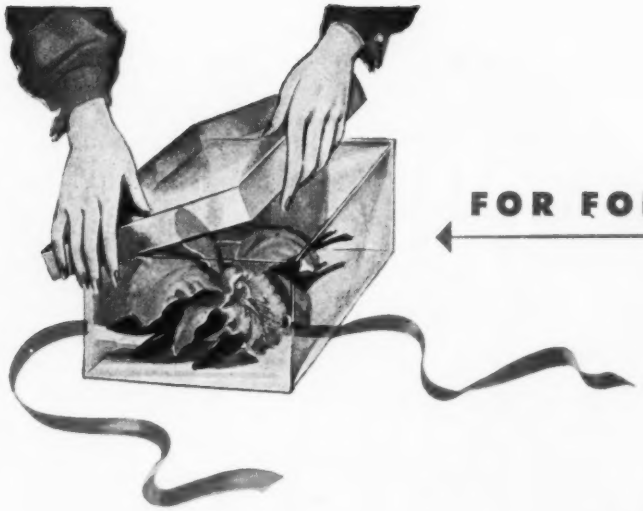
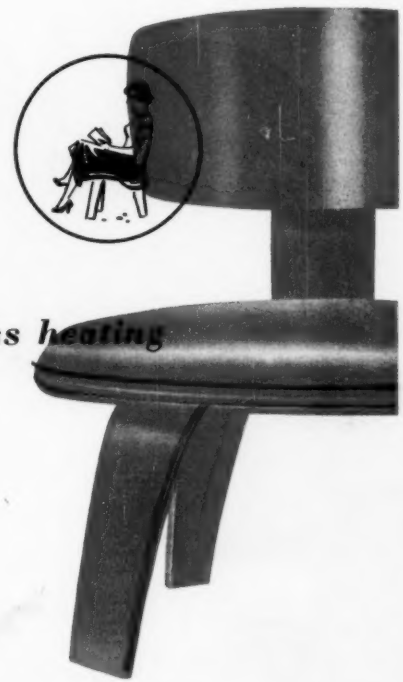


FOR FORMING

or

LAMINATING



Dowtherm

means accurate control in process heating

Because DOWTHERM heating means precision control, constant temperatures and uniform heat application, it makes possible new processes and new products.

In the plastics industry, DOWTHERM, used in molding plastic and rubber products, has improved product quality and reduced operating costs. Many production methods otherwise impossible can be utilized with DOWTHERM heating.

DOWTHERM speeds the heating cycle and at the same time reduces labor costs. Its outstanding characteristic is the accurate control it affords in obtaining temperatures between 300 and 750°F. at low pressures.

Are you fully acquainted with DOWTHERM's higher operating efficiency? We welcome the opportunity to discuss any process heat problems you may be confronted with. Write to Dept. DM-10A.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

SPEEDS HEATING • IMPROVES PRODUCTION

DOWTHERM

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CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

Now plastic SCRAP is not WASTE!

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Gering will buy your thermoplastic scrap, obsolete molding powders, rejects in any form . . . will reclaim and rejuvenate this valuable "scrap" into perfectly good molding powders . . . will sell you good reconditioned molding powders: Polystyrene, Cellulose Acetate, Ethyl Cellulose, Polyethylene, Butyrate, Vinyl, Acrylic.

Our Technical Service Department is at your service at all times.

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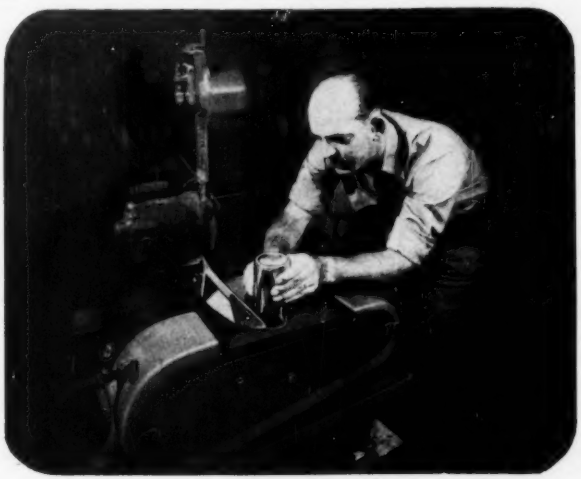

Short step to production savings

When you use waterproof cloth belts by CARBORUNDUM for wet sanding of plastics and other ductile materials, important production savings are the result. Specially processed to retard "wet stretch", waterproof cloth belts by CARBORUNDUM reduce downtime for tensioning adjustments. Fewer scratch rejections from backing imperfections are experienced since this belting is specially manufactured and treated to minimize these cloth defects.

These and other cost-cutting advantages provide a short, simple step to real production savings when you install waterproof cloth belts by CARBORUNDUM in your plastics processing. Ask your CARBORUNDUM representative for details. Coated Products Division, The Carborundum Company, Niagara Falls, N.Y.

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TRADE MARK

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more men and machines to produce your products better!

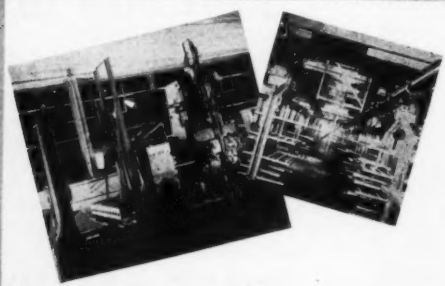
PLASTICS DIVISION
GENERAL AMERICAN

more injection

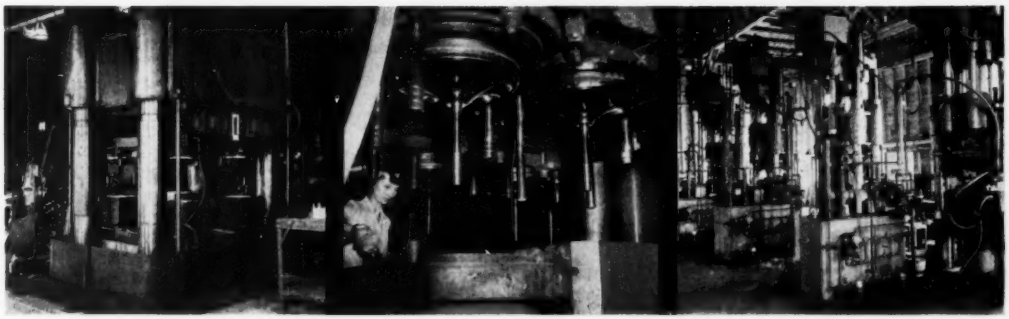
Batteries of presses ranging from 2 ounces to 48 ounces with new presses that can take up to 300 ounces being added!

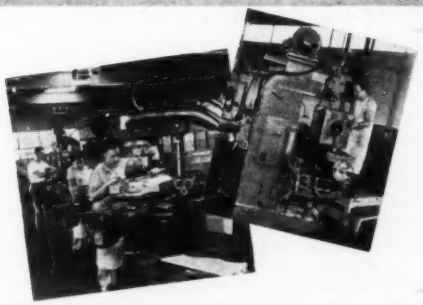
more compression

Batteries of presses ranging from 100 tons to mammoth 2,000 ton presses with 71" x 74" platen areas!



SEE General





more DIE-MAKING
One of the most modern and versatile shops in the plastics industry has been expanded to service your jobs being molded by General American.

more PAINTING and METALLIZING
Here are complete facilities for production-line painting and Logoquant-treating to improve the sales qualities of your products *economically*.

more FINISHING, ASSEMBLING and PACKING
The answer to climbing overhead on your cost sheets is for you to use the modern mechanized equipment and highly trained workers at General American.

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GENERAL AMERICAN TRANSPORTATION CORPORATION
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. . . for permanence, durability . . . under all conditions

HIGHEST QUALITY and UNIFORMITY

Specify Emery Plasticizers

For better products, products that stay better longer . . . use Emery Plastolein Plasticizers.

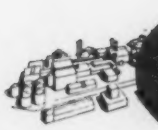
Developed especially for permanence and durability in all vinyl compounding. In addition, Emery's Plastolein* Plasticizers provide:

- Low volatility
- Heat and light stability
- High water and oil resistance
- Low modulus
- High tensile and tear strength
- Wide temperature performance

The above characteristics coupled with their unusual composition and physical properties make the Plastolein Plasticizers ideal for:

Sheeting — Coated fabrics — Unsupported films
Organosols and Plastisols — Extrusion compounds

*T. M. REG. U. S. PAT. OFF.



EMERY INDUSTRIES, INC.

Branch Offices:
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187 Perry St., Lowell, Mass.
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Silver Anniversary

WITH this issue, MODERN PLASTICS marks 25 years of continuous service to the Plastics Industry and to those who use plastics.

It has been a great privilege to share in the growth of the industry and not only to record that growth but to have made definite contributions to it.

The dramatic progress of plastics' use and the development of the industry have been much publicized. This, then, is not the time to talk about such matters — nor to discuss our own progress, which has been parallel.

It is customary on an anniversary to celebrate. The publisher of MODERN PLASTICS can think of no better way than to announce a new service in earnest of our intention to continue to meet the expanding needs of the Plastics Industry.

Plastics Merchandising, a new sister publication to MODERN PLASTICS, will make its appearance with the new year. It will serve the merchandising interests of plastics as we serve the industrial interests. It is designed to fill a need developed since the end of World War II for a publication which will concentrate on the presentation of new plastics products, information about plastics, and merchandising ideas for selling plastics at the retail level.

The publisher and the entire staff of MODERN PLASTICS are grateful to the industry for many expressions of faith and friendship, for thousands of cooperative contacts, for assistance and inspiration over a quarter of a century.

On our Silver Anniversary we pledge ourselves to maintain and increase the usefulness of this magazine in the service of the Plastics Industry. And we join with the staff of *Plastics Merchandising* in its pledge to provide equal quality of service on the distribution front.

MODERN PLASTICS

VOLUME 28 OCTOBER 1950 NUMBER 2

What's New in Decorative Laminates

HANDSOME, serviceable, versatile, the decorative laminates have been around for many years, growing steadily in volume and acceptance. During the past few years, however, the laminates have really surged ahead and are branching out into important new types of applications. Materials and methods have been improved, available colors and patterns have multiplied, and much thought has been given to simplified methods of application.

In the high pressure type laminates, layers of paper impregnated with phenolic resin provide the essential body of the material, while the surface is composed of a printed sheet with a transparent overlay of melamine-impregnated paper.

The low pressure laminate involves combinations of paper (or cloth) and polyester resins. Because these resins cure at moderate temperatures and with little or no pressure, such laminates can be produced on a continuous basis.

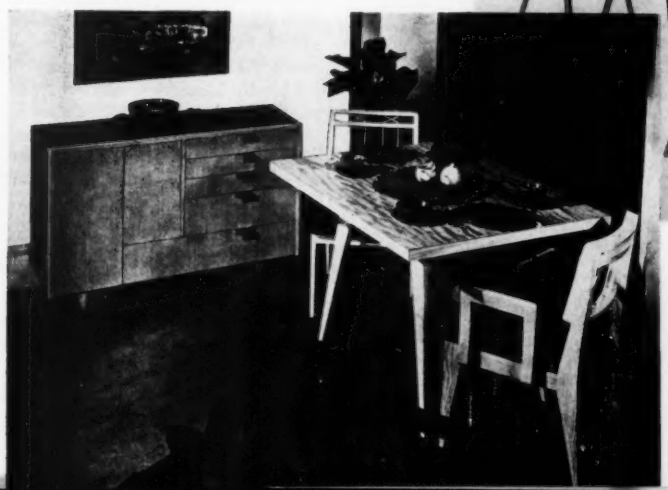
Decorative laminates—both high and low pressure—have reached their present wide acceptance because they combine good looks with extreme durability in normal service. In addition to the many woodgrains offered, the range of patterns and colors available is limited only by the ingenuity of the designer. The materials are highly heat resistant, and most of them are available in cigarette-proof grades if desired. They resist staining and chemical attack by most common agents and are easily kept clean. They will not scratch or mar under normal conditions of service. Painting and refinishing are never required.

Matched to Upholstery

The dinette field, where decorative laminates have now captured the major share of the market for top surfacing, taking over from porcelain-enameled steel and other materials, illustrates how the public has accepted these laminates. A few

Matching or contrasting wood-grain laminate top surfaces on dinette furniture—as on the buffet chest and table shown in photograph below—offer the advantages of great durability plus attractive appearance

COURTESY THE FORMICA CO.



COURTESY DAYSTROM CORP.

Decorative laminates have largely taken over from other materials in the field of dinette furniture. Dinette set above combines high-pressure laminate top with color-matched vinyl upholstery

Use of high pressure melamine wood-grain laminates on bedroom pieces reduces polishing and other upkeep of fine furniture to a minimum

years ago, a dinette table with a laminate top was a curiosity; now, other materials are rarely used for this application. An important factor in this transition was the teaming up of laminate tops with vinyl chair upholstery in colors and patterns which match or harmonize.

One of the newest developments in this field is the Coloramic dining set line introduced by Daystrom Corp., Olean, N. Y. The table tops are of Daystromite, a high pressure melamine laminate produced by the company at its own plant. The introductory Hollywood Coloramic set comes with a Pantasote stardust pattern upholstery material on the chairs in green, red, yellow, grey, and chartreuse. An exclusive feature of this set, marking a first in the furniture field, is the use of plastic-coated steel tubing in statuary bronze or silver grey on the chair and table legs. The leg-coating material is Tenite II cellulose acetate butyrate, applied by Samuel Moore & Co., Cleveland, Ohio, by its patented process.

The success of Daystrom's first Coloramic set has been such that the company is now offering two additional sets with color-matched tabletops and chair upholstery.

Other Furniture Uses

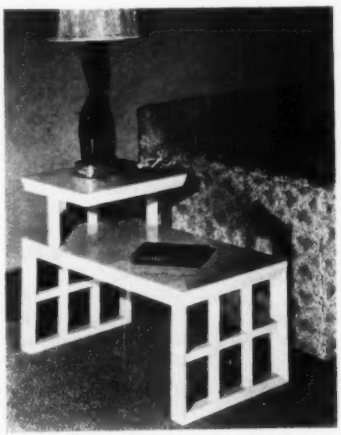
Furniture pieces on which plastic laminates are used are by no means limited to dinette tables. A highly significant development in the furniture field is the utilization of these materials in occasional pieces and other items of furniture. Thanks to this trend, tomorrow's housewife will find that her furniture keeps its new appearance much longer and is far less subject to scratching, staining, cigarette burns, and other damage.

Before plastic laminates came along, furniture manufacturers finished their products by either the use of time-honored varnish or by using spray guns and quick drying lacquers. Unfortunately, the "show room" gloss so produced cannot long endure when subjected to spilled drinks, carelessly discarded cigarettes, and everyday wear and tear. Stains, scratches, and other types of damage accumulate until costly refinishing is required.

A number of progressive manufacturers are now solving problems of finishing and refinishing by surfacing their furniture with decorative laminates. Although the materials are most widely employed on horizontal areas which are subject to heavy wear, they are also finding adoption for vertical areas subject to kicking and scuffing.

Pricewise, surfaces of this type compare favorably (on a finished piece basis) with high quality furniture on which some of the older, time-consuming finishing methods have been used. One important advantage gained with the laminate is that colors can be kept uniform, enabling a family to go back to the store several years after its original furniture purchase and get other pieces which will match perfectly.

In the office furniture field, the Leopold Desk Co., Burlington, Iowa, and The Herman Miller Furniture Co., Zeeland, Mich., are among those producing desks using Formica Realwood. In Realwood, a veneer of wood, 1/85 in. thick, protected by the transparent cover sheet, gives the finished product the appearance of actual wood. Another Formica wood-grain laminate called Picwood makes use of photographically reproduced wood grain to offer the equivalent eye appeal and durability of Realwood at lower cost. Among others, Vogue, Chicago, Ill., and American Chair Co., Sheboygan, Wis., are using Picwood in a number of furniture applications.



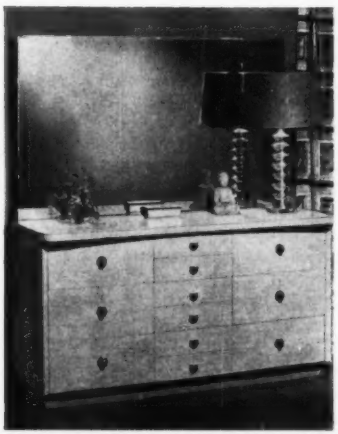
COURTESY THE FORMICA CO.

Blonde wood laminate lends itself ideally to high-style end table

Lincoln Industries, Marion, Va., another important furniture manufacturer, is now showing occasional pieces and a number of dining room and bedroom items surfaced with wood-grain Panelyte, a high pressure melamine laminate made by Panelyte Div., St. Regis Paper Co., Trenton, N. J. Use of the material in tops, sides, drawer fronts, etc., virtually eliminates the usual polishing and other upkeep associated with fine furniture.

The modern kitchen provides still another success story for decorative laminates. Many of the largest manufacturers of drain boards and other kitchen work surfaces now offer a major part of their output in plastic laminates. Such materials far outstrip linoleum in service, because they are harder and are unaffected by moisture, food acids, greases, etc. From a decorative standpoint, the laminates have greater warmth and color than stainless steel, aluminum, or porcelain enamel (which also chips), and enable the housewife to choose a pattern and color suiting her decorative scheme.

Artcrest Manufacturing Co., Inc., Chicago, recently switched from



COURTESY LINCOLN INDUSTRIES

Spilled perfume will not mar beauty of laminate dresser top

porcelain enamel tops on its sectional base kitchen cabinets to Conolite, a polyester-type laminate produced by the Plastics Div., Continental Can Co., Inc., Cambridge, Ohio. In this application, the 0.031-in. laminate is bonded directly to sheet steel by pressure. Edges are sealed by a stainless steel molding that keeps out dirt and grease. In another application, Conolite bonded to steel replaces porcelain enameled tops on a utility cart for home use made by Loroman Co., New York, N. Y.

Conolite is offered in four principal patterns—pearlescent, Alpine, monkscloth, and linen—and in a number of attractive colors. In bonding the material to supporting structures of wood, metal, hardboard, etc., cold press bonding with casein- or urea-type adhesives produces excellent results. The material comes in 0.031 and 0.050 in. thickness, standard sheet widths of 24, 30, and 36 in., and lengths of 48 and 96 inches.

Hotel Uses

With today's high labor costs, maintenance becomes a major problem in public and commercial buildings, hotels, etc., where the continued smart appearance of the property is important in building and holding patronage. At The Northernaire, a picturesque resort hotel at Three Lakes, Wis., decorative laminates have neatly solved this problem. The material used in this important installation is Consoweld, a high pressure melamine laminate made by Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., and available in a range which includes more than 30 colors and patterns.

Locations where Consoweld is used at The Northernaire include the bathrooms, indoor swimming pool, and massage room. Panels of laminate are used in the shower stalls and for the walls and wainscot of the bathrooms, in contrasting shades.

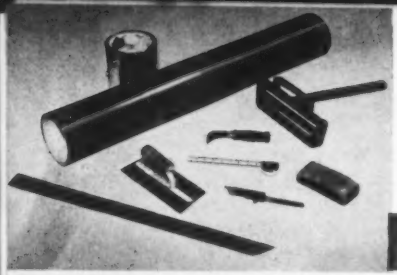
Wall Surfacing

Of special interest to the building industry is a large apartment project at Bryn Mawr, Pa., entailing the installation of approximately 120,000 sq. ft. of decorative Panelyte laminate in blue, yellow, and coral colors and a fine linen pattern. This material will be used in kitchens and baths for wall surfacing, and also on window sills and reveals and table tops.

This project, now under construction, will consist of 75 garden apartments. Panelyte panels and the specially processed matching molding strips were subjected to severe test before the FHA would sanction the application. Approved specifications called for the installation of Panelyte panels of $\frac{5}{32}$ in. thickness for the wall surfaces. The sheets are applied directly to the studding by means of a "floating"-type construction involving extruded aluminum moldings. No backing material or insulation is required. This floating construction makes allowance for any expansion or contraction of the laminate with temperature changes.

A unique feature of this installa-

Walls, wainscot, and molding of swimming pool in The Northernaire, a resort hotel, maintain smart appearance with ivory and black decorative laminates



tion is the use of molding strips which are surfaced with a matching laminate, eliminating unattractive joints. In setting up the walls, the aluminum molding is first nailed to the studding. Then the Panelyte panels are merely slipped into position; the panels themselves are neither screwed nor nailed. Inside and outside molding strips are used at corners, while a "snap-on" molding is used at panel joints along the flat surfaces of the wall.

The snap-on molding differs from corners in that the curved or raised portion of the strip is separate from the aluminum molding. Aluminum "U"-shaped channels are first affixed to the studding, after which the panels are butted against the "U". Finally, the curved portion, surfaced with matching laminate, is snapped in position over the open end of the "U". This covers the joint seam of the two laminate panels and holds them securely in place.

The Panelyte used on this job is a solid lamination 5/32 in. thick, composed of impregnated kraft paper and a printed surface sheet covered with a melamine sheet. It is sealed from the back to provide a balanced construction, preventing moisture absorption and warping. The material has good sound-proofing and insulating characteristics. The development of the plastic-surfaced aluminum molding strips was a cooperative effort by St. Regis and Keller Products, Inc., Holyoke, Mass.

Contact Pressure Application

Unique among the decorative laminates is Versibond, a new product of The Ohio Rubber Co., Willoughby, Ohio. Versibond is a high pressure melamine laminate which is integrally bonded during the laminating process to a metal or a flexible rubber backing, the latter being easily applied to many surfaces by mere contact pressure. Standard sizes are 30 by 72 in., 30 by 84 in., 36 by 72 in., 36 by 84 in., and 42 by 84 inches.

Versibond has successfully passed NEMA tests covering such properties as wear resistance, stain resistance, and heat resistance. The material can be boiled in water for at least an hour without loss of color or finish, and without effect on the bond. A can of oil, heated to 356° F. and placed on the material for 20 min., has no effect on color or finish.

Due to the flexibility of Versibond, the material may be coved either horizontally or vertically, permitting seam-free construction of drainboard and back-splash surfaces. Fastening studs or clips have been welded to metal-backed Versibond without doing any damage to the decorative surface.

Preliminary experimental work

Steps in applying rubber-backed melamine laminate: 1 — Ordinary hand tools are used for installation. Roll of laminate is at top. 2 — Uniform coating of cement is applied to sheet. 3 — Flexibility of laminate, here partially applied, permits easy handling. 4 — Contact pressure assures perfect bond. 5 — Typical kitchen application. Trim is not needed where top meets coved back

ALL PHOTOS THIS PAGE COURTESY THE OHIO RUBBER CO.

has demonstrated the feasibility of press molding Versibond, either rubber or metal backed, into such shapes as nosed and coved counter tops, table tops with radiused edges, sink tops completely formed with edges tapering to paper thinness, formed window sills, base moldings, and so on.

In making rubber-backed Versibond, Ohio Rubber employs a specially compounded elastomer of sufficient thickness to give the desired flexing properties, and yet of sufficient hardness to support the decorative melamine-impregnated paper surface with desirable rigidity. The paper used in Versibond, impregnated with American Cyanamid and Bakelite resins, is supplied by Fabricon Products, Inc., River Rouge, Mich.

In cutting small quantities of Versibond on the job, a conventional paper cutter, knife, or shears may be used. The manufacturer advises that the material be cut slightly oversize to allow for planing, sanding, or filing the edges to the desired smoothness, for which work conventional hand tools can be used. Production quantities are cut by bandsawing or jigsawing.

Orco C-182 and Orco C-185 cements are recommended for fastening Versibond to porous surfaces, and the latter for non-porous surfaces. American Cyanamid's Urac resin (with adhesive No. 185 and hardener No. 185) is recommended for manufacturers having glue machines and press set-up. A conventional hand roller such as is used in applying linoleum is employed in on-the-job installations to bring the rubber back of the sheet into contact with the base surface.

Bonded to Hardboard

Typifying new developments in the field of polyester decorative laminates is Lamidall, developed over a period of several years by Woodall Industries, Inc., and now in commercial production at the company's new plant in Skokie, Ill. Essentially, this laminate is made by the same basic process used for other polyesters. Its unique feature, however, is that the decorative material is integrally bonded to a base composed of tempered Masonite Presdwood.

All patterns and colors of Lamidall, including frosts, linens, velours, and wood grains, are available in 4 by 8 ft. and 4 by 12 ft. panels. Overall properties, such as tensile, flexural, and impact strength, parallel those of Masonite Presdwood. Because of the thickness and density of the composite product, there is no danger that the grain of the material over which the laminate is applied will be "telegraphed" through the decorative surface. The thickness and body imparted by the ⅛ in. panel of hardboard also provide additional resistance to heat and to denting.

Panels of Lamidall may be applied to wood, plaster, cement, brick, or other flat surfaces with a mastic-type cement of which 3M Adhesive EC-194 is representative. The panels can also be bonded to plywood or other suitable core materials for fabrication of table tops, counter tops, kitchen work surfaces, and other products.

Lamidall is recommended for a wide range of applications including wall paneling, wainscoting, counter fronts, doors, partitions, furniture, cabinets, caskets, novelties, trailer and bus paneling, etc. The material does not blister, warp, or show any other discernible surface disturbances when tested with boiling water and hot oil in a can.

The use of Lamidall is not confined to flat surfaces; the material may also be contoured to some extent. It may be sawed, shaped, nailed, punched, or drilled with standard woodworking tools or equipment. Although panels are usually applied to wall surfaces by means of an adhesive, Lamidall panels with beveled edges and scored borders may also be nailed in the score lines to a dependable nailing base.

In the Lamidall production process, the sheets of hardboard are fed in a continuous procession beneath the resin-saturated decorative sheets, bonding firmly to them as the polyester resin cures.

Lignin Laminate

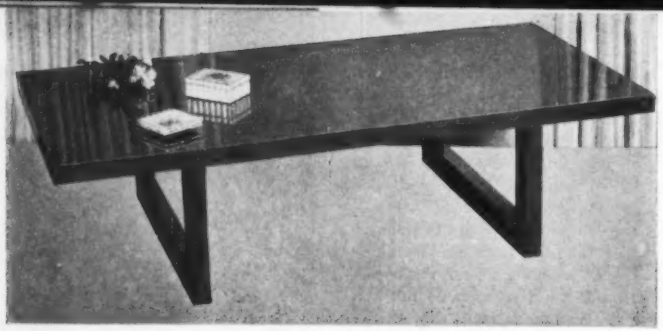
Howard Smith Paper Mills, Ltd., Montreal, Canada, has made important contributions to the decorative laminate field through its extensive work with lignin, the natural cement which binds wood fibers together. (See also MODERN PLASTICS, April, 1947, p. 106.) One of the end results of this activity was the development of a phenolic-lignin enriched paper-base laminate marketed in Canada under the name of Arborite.

COURTESY CONTINENTAL CAN CO., INC.

Polyester laminate top of cabinet is bonded directly to steel

Through the process evolved by this organization, lignin is successfully isolated from the waste liquor of the alkaline (soda or kraft) pulp-making system. This lignin material, reduced to a powder form known as Tomlinite, has a melting point of about 170° C.

The Arborite laminate which is made from this material has been employed as a table-top material, a ⅛-in. thick decorative wall board, for doors, and in other construction. As a table-top material, in some cases the sheet has been mounted on a plywood core; in other instances, ¾-in. Arborite stock is mounted directly on metal



COURTESY REISS ASSOCIATES INC.

Coffee table with top surfaced with wood-grain laminate is available in a variety of sizes and patterns; laminate has either high gloss or satin finish

A veneer of actual wood, 1/85 in. thick and protected by transparent cover sheet, is used in the laminate on the top and sides of this hotel room desk

COURTESY THE HERMAN MILLER FURNITURE CO.

stands. The laminate paper is produced on a conventional paper machine from pulp enriched with the resin in the beater, eliminating slow and expensive impregnation. Lamination is carried out in the usual multiple platen hot laminating-type press.

The natural color of this laminate is a deep walnut brown. For decorative purposes, a paper surface sheet carrying the desired design is usually incorporated and the entire layup impregnated with a melamine resin. For extra protection against scratching, a transparent melamine-impregnated cover sheet is added. Arborite is outstanding for its structural stability under varying temperatures and atmospheric conditions, its excellent machinability, and lastly, for its extraordinary toughness.

Patterns, Colors Multiply

New colors, patterns, and surface effects are currently extending the range of application for decorative laminates. General Electric Co., Pittsfield, Mass., a short time ago announced its new Regent pattern in five colors for its Textolite line of high pressure laminates. Textolite, also available in a large selection of other patterns and plain colors, has been widely used for table tops, counters, show cases, kitchen cabinets, sinks, bars, and window sills, as well as in elevators and other building applications.

Numa Plastics Corp., New York, N. Y., has introduced new patterns of pink marble, oriental marble, grey marble, and rainbow-veined and clouded effects for its line of high pressure laminates, in which Monsanto's Resimene melamine resins are used. The company has designed a series of modern coffee tables and matching stool-tables with tops of this material, which can also be used for wall paneling and other applications.

A new three-dimensional weave design has been announced by Reiss Associates Inc., Boston, Mass., for its line of Railite laminated plastic sheets. Available in red, blue, green, grey, and tan, the new pattern has been hailed as a refreshing new approach for use in the manufacture of kitchen and dinette furniture and accessories. Reiss also produces a wood-grain laminate under the name Richwood.

Another new development involving decorative laminates has been launched by United States Plywood Corp., New York, N. Y., exclusive distributor for the decorative grades of Micarta high pressure laminate made by Westinghouse. The material, bonded to plywood, is now available in a new range of sizes which virtually eliminates all waste. The new sizes include 48 by 96 in. material for walls, wainscot, and general use; 30 by 96 in. for counter fronts, wide counter tops, and sink tops with back splashes; 30 by 60 in. for table and built-in dinette tops; and 24 by 96 in. for counter tops.

Farley & Loetscher Mfg. Co., Dubuque, Iowa, producer of Farlite high pressure decorative laminate in over 50 designs and solid colors in 12 standard sheet sizes, has been active in the plastics field since 1929. The standard Farlite sheets, $\frac{1}{16}$ in. in thickness, are supplied to fabricators and manufacturers with backs sanded for cold gluing to plywood or other suitable core material. This company also makes the product available in complete 5-ply tops and panels of 1 in. and $1\frac{1}{4}$ in. thickness. Standard tops and panel sizes are 24, 30, and 36 in. wide and 42, 60, 72, and 84 in. long.

Johns Manville Corp., long a dominant factor in the building field, has recently added De Luxe Flexboard to its wide variety of

products. This new board consists of J-M's well known Flexboard asbestos-base panels with a decorative laminate surface.

Allyl Resin Laminates

A new type of plastic-impregnated paper, designated as Phenopreg RP, is now in commercial operation at Fabricon Products, Inc., River Rouge, Mich. The paper is saturated with Shell Chemical Corp.'s new low molecular weight allyl polymers. These resins cure under heat and pressure to form hard, insoluble, thermoset polymers. Phenopreg RP is used for direct surfacing of plywoods and synthetic hardboards, such as Masonite Presdwood. The product is self-adherent to the board without the use of any separate adhesive and produces a very satisfactory bond. It is supplied in roll form or cut sizes in a variety of attractive decorative patterns and is also available as a translucent overlay for surfacing decorative patterns or for bonding directly to wood to protect and enhance the beauty of the surface.

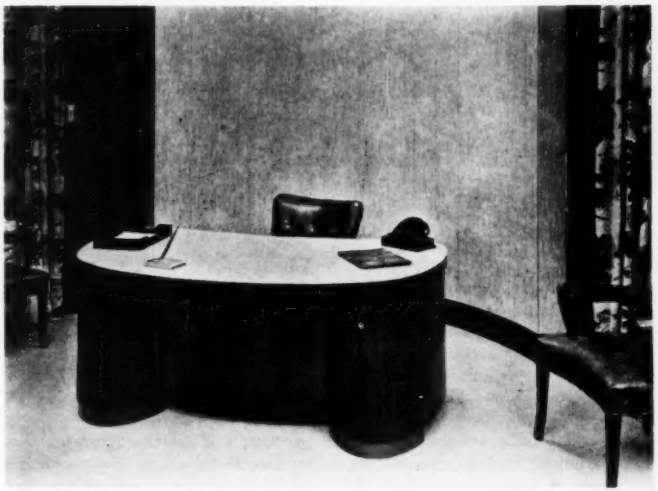
Surfaces ranging from a high gloss to a satin finish are possible, and the resin is said to show sufficient flow in the pressing operation to permit a variety of texturized effects with special cauls.

Phenopreg RP is stable for lengthy periods of storage at room temperatures. The resin is said to show very slight post-curing shrinkage, thereby giving freedom from surface checking problems. Outdoor exposure tests and accelerated laboratory testing indicate that the allyl polymer in the material has excellent chemical and physical properties.

Swedlow Plastics Co., Los Angeles, Calif., is now producing a line of decorative laminates in which these same Shell resins are used. The line includes frost, linen, and lava patterns, each in five or six colors, as well as two wood grains—dark walnut and light wood grain. The paper, of approximately 5 mil thickness, is obtained from Decotone Product Div., Fitchburg Paper Co., Boston, Mass., and also from Morart Gravure Corp., Holyoke, Mass.

In the production of the new Swedlow material, the paper is passed through an impregnating machine, then placed on panels of Masonite hardboard and cured in a 20-opening press with 4 by 8 ft. platens. A phenolic-impregnated sheet is used on the back of the hardboard to provide a balanced construction. The material is applied to wall surfaces by means of a suitable mastic.

Just as the range of colors, patterns, and types of decorative laminates has increased, so have their end uses. And as more and more manufacturers become aware of the inherent advantages of this hard-working branch of the plastics family, applications will spread in those fields already tapped and into others as yet untouched.

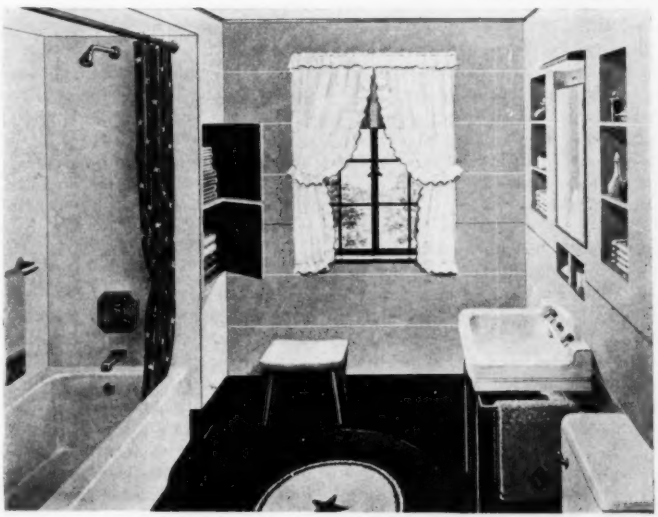


COURTESY WOODALL INDUSTRIES, INC.

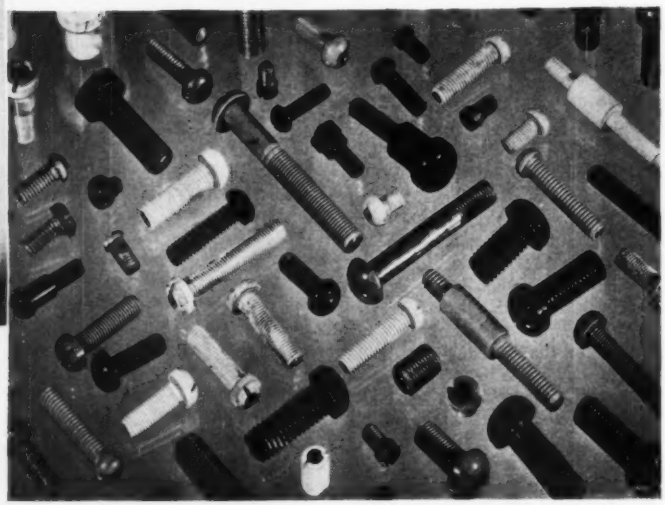
Polyester laminate, integrally bonded to hardboard, can be contoured as on back wall. Material may be applied by using adhesive or nailing in place

Easily cleaned water- and steam-resistant panels have decorative surfaces laminated to an asbestos base. The colors blend with bathroom fixtures

COURTESY JOHNS MANVILLE CORP.



Plastic Screw with



Above: Cross-section of plastic-metal screw, showing plastic bonded to serrations cut into metal rod. Composite unit is formed by cutting threads only into plastic. Right: Screws are made of different plastics in many sizes and types, and in a wide variety of colors.

EVERY once in a while a new application for plastics comes along that involves not just a new product but a new type of use for plastics. In this category falls a new plastic-metal fastener, recently introduced by Forman Insulating Screw Corp., New York, N. Y. Plastic screws, as such, have been known for many years, but their uses have been limited by the physical property requirements of industrial applications. What was needed was a screw fastener with the strength characteristics of metal and the electrical, thermal, and chemical properties of plastics. The answer —obvious enough once the details were worked out—is a plastic screw with a metal core.

This is what Forman has done and here is how the plastics metal fastener is produced. Overlapping serrations are cut in a metal rod to give an effect somewhat like knurling. A layer of a plastic material is then extruded over the metal rod, the plastic flowing into the serrations and bonding tightly to the metal. This composite plastic-metal rod is then formed and threaded on an automatic screw machine, the threads being cut only in the plastic covering and not extending through to the metal core. The resulting screw is completely electrically insulated and has the corollary advantages of resistance to shock, vibration, and corrosion.

Mechanical tests made under torque and axial pull, as well as dielectric strength tests, show the plastic-metal screws to have ample physical and dielectric strengths for a wide range of applications.

Forman is currently mass producing the new fastener in four plastics: cellulose acetate, polyethylene, cellulose acetate butyrate, and ethyl cellulose. Other extrudable plastics are available on special order, and will be mass produced when demand by various industries warrants it.

Fields of Use

Research by the producing company and suggestions from users indicate that the new composite screws have major uses in the electrical and electronic fields, in mechanical components, and in the chemical industry.

When used in electrical component design, the plastic insulated fastener makes possible some entirely new concepts. For example, the insulating boots, washers, tubes, and bushings formerly used to insulate metal sections can be replaced by a single fastener that carries the insulation as an integral part of the screw. Imaginative electrical designers have already taken advantage of this feature to create new electrical components that are smaller, cheaper, and simpler to manufacture and use. Applications in the electrical field extend from simple jacks and relays to complex electronic calculators.

In the design of strictly mechanical parts, the advantages of vibration and shock resistance, as well as the self-locking characteristics of the threads, make this new plastic product the most important recent development in the fastener field. In a sound recording machine produced by Sil-Rod Laboratories, New York, N. Y., for example, screws with a soft flow plastic were chosen to mount components subject to vibration. The low frequency vibration was eliminated and with it an annoying resonance in the surrounding cabinet. More intense vibrations, inherent in many mechanical components, do not

Metal Core

New fastener combines high strength with electrical insulation, self-locking characteristics, and excellent vibration and chemical resistance

loosen the bond between the plastic threads and the internal threads of a metal nut.

The vibration-resisting characteristics of these plastic-metal screws is the property which led Jacquard Knitting Machine Co., Philadelphia, Pa., to choose them for wide use in the equipment which it manufactures. This same property, plus electrical insulation, is made use of in assembling the electrical components of seismographs produced by Seismograph Service Corp., Tulsa, Okla.

For applications in the chemical and food industries, the choice of plastics and metals available in Forman screws lends itself to the production of chemically resistant fasteners. The plastic exterior of these composite screws can be used as a liquid seal in containers, particularly in cigarette lighters, atomizers, or bung taps in drums. The threads of the screw act as a multiple unit of washers and, in effect, produce a perfect seal. This application is of great importance where highly volatile chemicals are used. In the field of refrigeration, for example, the new plastic metal screw can be used to replace the insulating bushings and extruded washers that prevent loss of refrigeration and chemical refrigerants. Furthermore, when used in or around food containers they impart no odor, stain, or taste of any kind whatever, and can be made fully resistant to the effects of food acids.

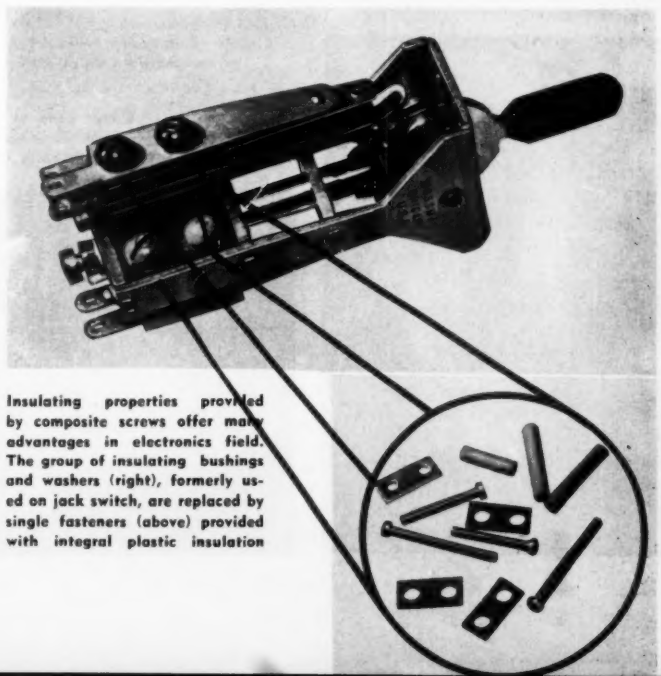
The torque of driving is applied only to the metal core of screw

Because the plastic exterior of these screw fasteners can be produced in an almost unlimited range of colors, they can well be adapted to the simplification of production color coding systems. In certain applications where color is a dominant appearance-factor, matching or contrasting screw colors offer obvious advantages.

Selection Factors

Of course, the new fasteners are selected by length, diameter, and type of thread, like any other screw, with the added consideration of the plastic material best suited to the end use. Composite screws that are available now range in size from No. 8 to ½ in. diameter with cellulose acetate; from No. 10 to ⅜ in. diameter with butyrate; and from No. 8 to ½ in. with ethyl cellulose. A much more complete list of sizes, head shapes, and thread types is scheduled for future production.

As is usually the case when an entirely new type of product is under development, Forman found that current manufacturing methods had to be revised to suit the company's special needs. Certain types of plastics and specific flows proved to be the best basic selection to fit the majority of applications, and at the same time, to be the most practical to extrude and machine. A more extensive development program has now been set up at a leading university research institution to further refine material selection and production methods. This program will concentrate on the little-known problems of mechanical vibration and fatigue properties of plastics and plastic-metal laminates, and on new techniques for screw-machining plastics. The results of this test and development program promise to be an important addition to plastics literature.



Insulating properties provided by composite screws offer many advantages in electronics field. The group of insulating bushings and washers (right), formerly used on jack switch, are replaced by single fasteners (above) provided with integral plastic insulation

Shoe Counters of Polyethylene

ONCE again a plastic is doing a better job than the materials which it replaces. Molded polyethylene is being used by Endicott Johnson Corp., Johnson City, N. Y., in place of leather or fiber for shoe counters. This part of a shoe is the stiffening piece which is assembled into the back of the shoe between the outer leather (shoe quarter) and the inner or quarter lining.

The shoe industry is old and, although not "set" in its ways, requires absolute assurance that a change in materials or methods will improve quality. This assurance only comes about after long periods of exhaustive testing. Thus when George W. Johnson, Chairman of the Board of Endicott Johnson, states that "this new application of Bakelite polyethylene produces the best counter the shoe industry has ever had," it can be taken as a proved fact.

The name for this new shoe part, Perma counter[1], was chosen because in all tests the counter has outlasted the shoe, even in shoes for children. Few children use a shoe-horn and the majority don't even unlace their shoes, so that in putting them on the back of the shoe is crushed and becomes unsightly in short order. Test shoes built around the new Perma counter have withstood the worst abuse by children.

After Otis W. Farnam, superintendent of the Counter Dept., Endicott Johnson Corp., had decided that polyethylene could be used in this application, a combination mold with cavities for seven different sizes was produced. This mold was built by Lancaster Moulded Plastics Corp., Lancaster, Mass., and is now running on production in that plant on a 2-oz. Lester machine.

Adhesive Plus

The weights of the parts range from 11 to 30 g. each, according to size. After the parts are injection molded, the only finishing comprises cutting the gates. They are then shipped to Johnson City for assembling in the shoe. Here the counters are first dipped into an adhesive and then dried. The inner surfaces of the shoe quarter and quarter lining are coated with a special agent which reactivates the adhesive on the polyethylene counter when the surfaces are placed together. The entire shoe upper is next assembled on the last and the adhesive-coated counter slipped into position between the quarter lining and the quarter. The balance of the shoe-building operation then proceeds in the normal manner.

There are many advantages to this counter other than its stability and life expectancy. In order to have a well-fitting and comfortable shoe, the top heel portion of the counter should be tapered. In very high-priced shoes making use of leather counters, this taper is obtained by hand skiving. The result is that the tapers are not always uniform. In the production of fiber counters it is practically impossible to achieve the required taper, and therefore this type of counter is not carried to the top of the quarter. In injection molded polyethylene counters, the taper is uniform and accurate for every shoe and provides a perfect fit to the very top of the quarter. Further, leather and fiber change shape from body heat and moisture; polyethylene is unaffected.

As added proof of the efficiency of this new plastic application, The Brunswick-Balke-Collender Co., Inc., Chicago, Ill., has commissioned Endicott Johnson to use the polyethylene counter in the manufacture of all of its bowling shoes.

[1]Patent applied for by Robert J. Marcy

Left: Polyethylene stiffener is cemented into back of the shoe between outer leather quarter and inner lining

Below: Shoe at left, built with polyethylene counter, still retains its shape in back, although it has undergone considerably more wear than shoe at right with fiber stiffener

Polystyrene foam is produced in the form of "logs" with rough, bark-like outer surface. Boards or blocks can be cut from the logs. One man can lift an 8 ft. long log easily

ALL PHOTOS ON THIS PAGE COURTESY THE DOW CHEMICAL CO.

Foam and the Future

With demand for polystyrene foam exceeding production, other foamed plastics still await commercial exploitation

VARIOUS foamed plastics materials, ranging from sponge-like to cork-like, are available commercially or have been produced on a pilot plant basis.[1] All of them consist of a lot of air and a relatively low resin content. With one outstanding exception, the careers of these materials have paralleled their composition: a lot of talk about potentialities but relatively few successful commercial applications as yet.

These materials, however, do have unusual and interesting properties and potentialities which are more than just talk. And the one exception, foamed polystyrene, has found so many applications that the producer cannot keep up with demand. As a result, only a few of the possible applications have been realized. Thus a survey of foamed plastics materials and their applications may indicate what the future can bring.

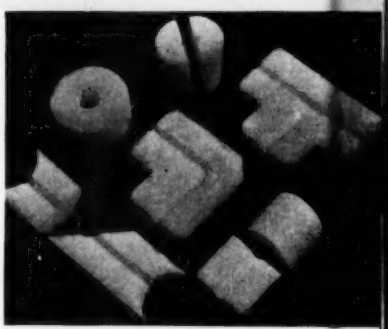
Polystyrene Foam

Foamed polystyrene is made under the trade name of Styrofoam by The Dow Chemical Co., Midland, Mich. It is a snow-white material produced by expanding polystyrene 40 times and has a density of 1.6 lb. per cubic foot.

Styrofoam is available in the form of rough "logs," in the form of boards, or as a ground material. Boards ½, ¾, 1, 2, 3, 4, and 5 in. thick are available in 10 and 12-in. widths in packages measuring 20 by 24 by 36 inches. In truckload or carload quantities, unpackaged 9-ft. long boards in thicknesses of 2, 3, 4, or 5 in. are available in the same range of widths as the packaged boards.

Styrofoam can be fabricated easily on a lathe, circular saw, band saw, jig saw, or drill press. Straight shapes of constant cross section can be produced by passing boards through heated knife-edge dies. Schwab & Frank Inc., Detroit, Mich., one of the pioneer fabricators of Styrofoam, has machines which can produce as many as 1000 Christmas tree ornaments per hour per machine.

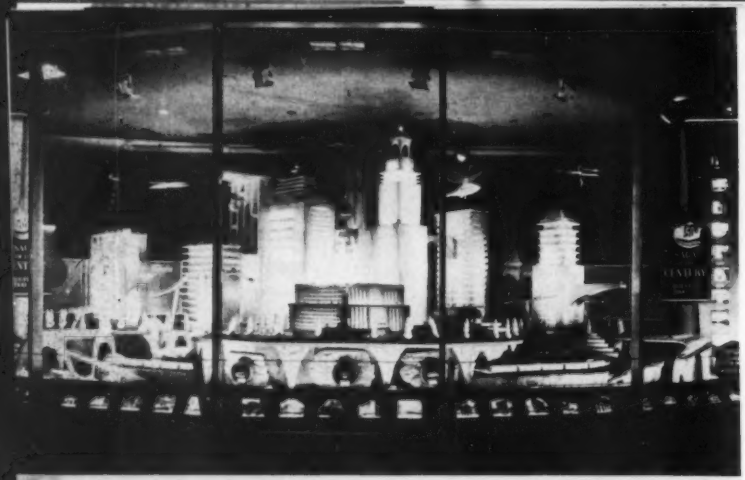
The first applications of Styrofoam were in life rafts, life preservers, and other flotation equipment during World War II. One of the few post-war applications which makes use of Styrofoam's low speci-



Light weight pipe shields, fabricated of polystyrene foam material, come in various cross sections

Flotation characteristics of polystyrene foam make it an ideal material for water closet tank float which will not rust or corrode and will not sink even if punctured

[1] For a discussion of the types of foamed plastics, the foaming methods used, and the properties of the foamed materials, see the article "Expanded Plastics," "1950 Modern Plastics Encyclopedia and Engineer's Handbook," p. 900.



COURTESY THE DOW CHEMICAL CO.

Foley Bros. window display, showing Houston as it may look in the year 2000, was designed and produced in foamed polystyrene by W. L. Stensgaard & Assoc.

fic gravity and its ability to float even after being punctured is a toilet tank float made by The Toughbuoy Co., Dubuque, Iowa. The cubical, leak-proof, corrosion-proof float is fastened to the float mechanism by a molded styrene screw bushing which is forced into an undersized hole in the float and anchored in place by means of an adhesive.

After the war, Dow improved Styrofoam so as to make it more suitable for use as a low temperature insulation material. Styrofoam has been used for wall, floor, and ceiling insulation in cold storage plants and similar installations. It has also been fabricated into light weight pipe shields for use in chemical processing plants, oil refineries, and cold storage units on pipe lines where temperatures range from 175° to –250° F. The shields, known as K-Shields, are sold by Robinson Industries, Coleman, Mich.

Insulation applications, however, have never accounted for a substantial poundage of Styrofoam. The thermal conductivity of the material is low (it has a K factor[2] of 0.27) and it seems to have many other desirable characteristics as an insulation material. But Dow has not promoted Styrofoam extensively in this field, mainly because its phenomenal success in other fields has accounted for all available production of the material.

Most of the Styrofoam made is used in the display field. It has been used in everything from small point-of-sale displays to a spectacular Santa Claus 51 ft. high. The delicate, snow-like appearance of the material makes it particularly suitable where it is desired to give an impression of coolness, such as in displays for summer drinks or for Christmas merchandising.

One of the most complete lines of styrene foam retail store displays is that produced by W. L. Stensgaard and Associates, Inc., Chicago, Ill. This line includes seasonal and specialty displays ranging in size from 3 to 11 ft. high, some of them with built-in mechanical action and lighting effects. So extensive is the line that many stores set up complete animated circuses centering around 11-ft. tall giraffes, 74-in. long seals, 8-ft. high clowns, 80-in. high circus bears, and other similar specialties.

Stensgaard's displays are fabricated in sections and assembled by its own production methods. Many of the parts are produced on multiple carving machines in which a wooden carved model serves as the guide. The foamed styrene is cut to size to conform to the object to be carved and one block is placed in each section of the machine. With this set-up it is possible to shape from 12 to 24 foamed styrene pieces simultaneously.

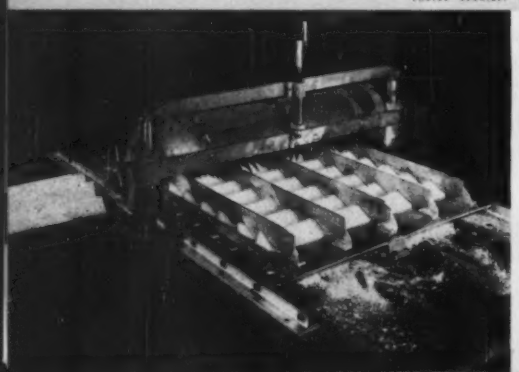
Styrofoam Christmas decorations and tree ornaments have found a steadily growing market. Among the Styrofoam fabricators produc-

[2]The K factor, the standard measure of insulating value of a material, is thermal conductivity expressed in B.T.U. per hr. per sq. ft. per degree fahrenheit per in. of thickness. The lower the K factor, the higher the insulating value of a material.

Foamed polystyrene Christmas ornaments are fabricated on equipment with heated knives and automatic feed

In addition to special equipment, circular saws, drills (below), and other standard tools can be used on foamed styrene

PHOTOS COURTESY SCHWAB & FRANK INC.



ing such products are: Schwab & Frank; The Ove Gnatt Co., Inc., La Porte, Ind.; and Nesbit Industries, Inc., Chicago, Ill.

Closely related to the display field is the use of Styrofoam blocks or fabricated shapes as a base for florist's displays and for floral arrangement and wreaths. Because of the material's resistance to moisture and the fact that it will not discolor or accumulate odors, shredded Styrofoam is being sold as a bulb growing medium and as a material to be packed into vases to hold cut flowers. O. E. Linck Co., Inc., Clifton, N. J., is selling the material for this purpose under the name of Tat Flower-Set.

The same factors which led to the success of the material in the display field have led to its use for specialized packages. In such applications the Styrofoam serves as a protection for fragile contents as well as an attractive attention-getting package.

Phenolic Foam

In 1945, the Chemical Dept., General Electric Co., Pittsfield, Mass., announced the availability of G-E phenolic foam. The material, according to a technical report issued by the manufacturer, has a density ranging from 3 to 10 lb. per cu. ft. and a K factor of between 0.24 and 0.28. The material has a pink color when produced, but it gradually darkens to the characteristic phenolic brown.

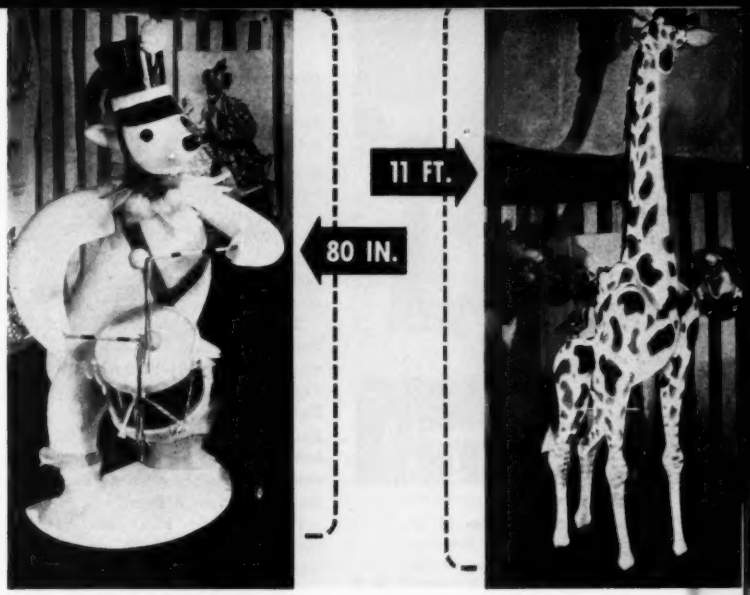
In addition to the light weight and insulating power of the material, its chief advantage is its "self-fabricating property," i.e., the fact that it can be foamed in place. The materials from which phenolic foam is made can be supplied as a series of ingredients to be mixed and poured on the job so that the foam can be actually "manufactured" between the walls of a building, inside the double walls of a refrigerator, etc.

But despite all these advantages, there have been no significant applications of G-E phenolic foam to date.

Early in 1949, Westinghouse Electric Corp., Pittsburgh, Pa., also announced the development of a phenolic foam material which could be foamed in place for such applications as insulation for refrigerator doors, etc. This foam material, according to an Information Bulletin released by Westinghouse, has a density ranging from 0.6 to 2 lb. per cu. ft. and a K factor of 0.20 to 0.30.

When Westinghouse announced this material, one of its research chemists predicted that it "may have quite a wide range of applications eventually." To date, the material is available only in small quantities and no commercial applications have been announced.

Despite the lack of success of G-E and Westinghouse phenolic foam to date, at least one other resin producer is convinced that the material has possibilities. In 1950, Bakelite Div., Union Carbide and Carbon Corp., announced "a new series of resinous compositions," Bakelite foamable phenolic resins. These resins "self-foam to yield



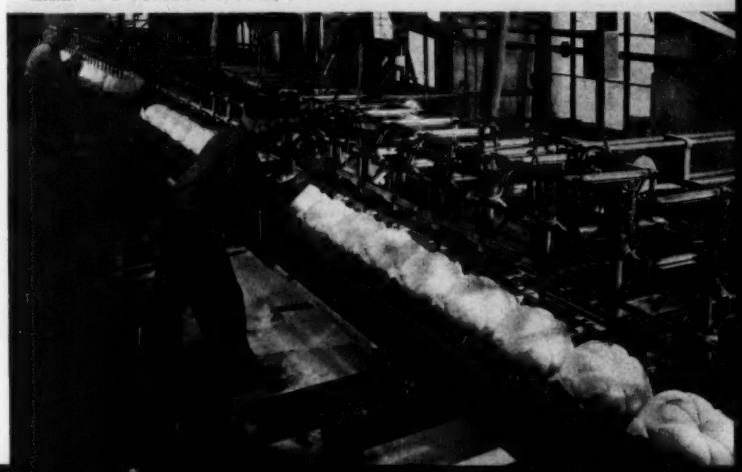
PHOTOS COURTESY W. L. STENSGAARD & ASSOCIATES, INC.

Animated polystyrene foam bear has motor which moves his head from side to side and moves his arms to beat drum

Giant polystyrene foam giraffe is authentically colored, attracts customers to toy departments or to special promotions

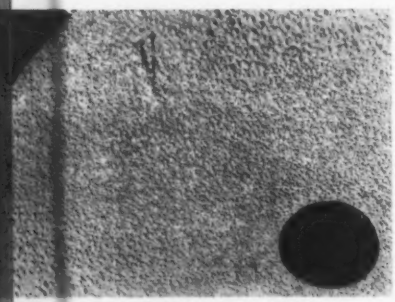
Twelve to 24 polystyrene foam parts can be carved at a time on specially developed machines. Wooden model in center of machine serves as a pattern

COURTESY W. L. STENSGAARD & ASSOCIATES, INC.



COURTESY WESTINGHOUSE ELECTRIC CORP.

Chunk of phenolic foam on left of scale is so light that it balances small pile of pie meringue on the right. Both weigh only 5 ounces



COURTESY NAUGATUCK CHEMICAL DIV., U. S. RUBBER CO.

Size and structure of cells in vinyl foam material shows up in comparison with pin (upper left)

products having weights of ⅛ to 2 lb. per cubic foot." The foam can be produced in some pastel colors by the addition of a dispersed pigment or dye at the time when foaming is accomplished.

As possible applications for its phenolic foam material, Bakelite named "uses in the insulation, packaging, structural, space filling, and novelty fields."

The phenolic foam material is made by mixing liquid resins with an acidic catalyst at room temperature. There are, according to Bakelite, three methods of producing the foam. The simplest is a batch operation in which resin and catalyst are mixed in a container, then poured in a form.

Bakelite has also developed a continuous process in which the catalyst and resin are metered into a mixing chamber and then discharged into a form or onto a continuous belt. A second continuous forming method which has proved successful in the laboratory involves the use of a two-jet spray gun which mixes the catalyst and resin in an atomized state.

At present Bakelite believes that the packaging field offers the most promising immediate future for phenolic foam. Glass ampoules, delicate glass laboratory equipment, and other fragile objects could be shipped safely between blocks of the foam material shaped to fit exactly around the contents and hold them securely in place during shipment.

However, Bakelite is proceeding cautiously in developing applications because of certain dangers inherent in the nature of the material. The resins, prior to completion of foaming, contain some free phenol (carbolic acid) and therefore must be handled carefully. The catalyst solutions used are strongly acidic and are likely to cause corrosion of metals with which they are in contact for long periods.

Vinyl Foam

The Sponge Rubber Products Co., Shelton, Conn., a large producer of cellular rubber, has long been searching for other materials which are superior in certain respects to the company's products. The company now believes that it has found one answer in unicellular expanded polyvinyl chloride and is in pilot plant production on this material.

The foamed vinyl material is produced with a non-toxic chemical blowing agent. The company has applied for a patent on its foaming process, which is an improvement over one used in Germany during the war. The Germans used a highly toxic blowing agent (Porophor N), and the foamed products were also toxic, which severely limited the range of possible commercial applications.

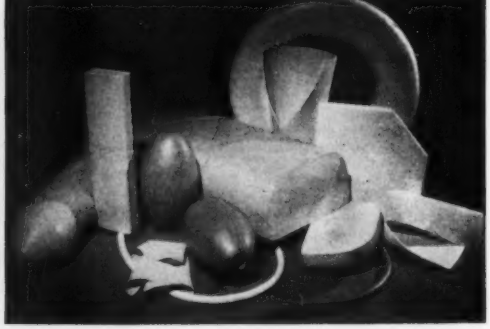
Sponge Rubber Products can produce its Plasti-Cell foamed vinyl material in densities ranging from 2½ to 12 lb. per cubic foot. The compression resistance of the material, of course, varies with the density. The compression resistance is expressed by the force required

(*Continued on p.* 166)

Ice bucket with good insulating qualities is molded of vinyl foam material in undersize mold, expanded after molding

Fish net floats, boat fenders, and other shapes have been produced on laboratory basis of unicellular expanded vinyl

PHOTOS COURTESY SPONGE RUBBER PRODUCTS CO.



Military-type toy line, here laid out on replica of Korean terrain, is molded in olive drab-colored styrene. Inscriptions on pieces are heat debossed. Top row, left to right: Army stake body truck, Red Cross truck, Field Canteen truck, and utility truck. Bottom row: wrecker, four line trucks, vehicle transport, open truck, van

Toys Convert to War

WITH the international situation pointing towards a large market for military-type toys, Pyro Plastics Corp., Union, N. J., has made the initial move among plastic toy manufacturers to "mobilize" its line.

Pyro, ingeniously and inexpensively, made the conversion by changing the styrene molding powder used from various bright colors to olive drab and by debossing the U. S. Army inscriptions. At the same time, Pyro added new "military" items to its line as well as utilizing many items from the "civilian" line.

The company actually began product development on this military line nine months ago. However, at that time the whole idea was strictly a gamble because the international situation did not then warrent such a line of toys. Accordingly, Pyro shelved the development until this July when the Korean war news forced the issue.

Included in the line are such interesting pieces as an army dredge complete with steam shovel and chain; an army duck that carries two soldiers, a jeep, and a field artillery piece; and a transport wrecker complete with moving winch and chain. In addition, there are various vans, trucks, and trailers. The chassis for the various large trucks are all from the same mold; the same is true for the smaller items.

With these toys now being displayed by the large variety chain stores en masse, Pyro has maintained a line which has excellent play value and possesses educational features abreast of the times.

The company is extending its military toy line to include a mobile anti-aircraft truck. The anti-aircraft gun and its attendant equipment swing around a center pivot

Readily identifiable in the photograph below are an army ferryboat, a dredge complete with steam shovel and chain, motorcycle, whistle, army duck, cruiser and two hand guns

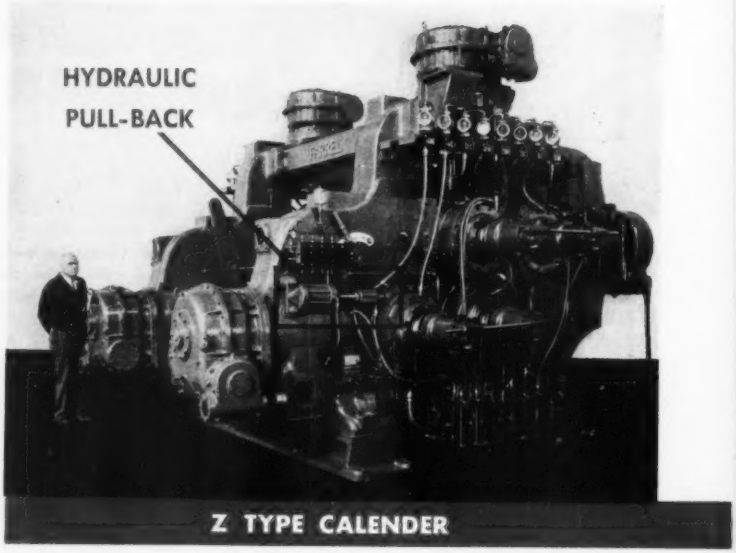
Calendering Is An Art

IF plastics materials could be endowed with human characteristics, the property of "most temperamental" would fit vinyl film perfectly. If everything pertaining to its life isn't just "according to Hoyle," it can have more ornery traits than all the rest of the plastics family put together.

Of course, there are ways to avoid most of these vinyl film troubles, if the producer has proper equipment and understands the art of making his product with the utmost precision and care. But if he relaxes, gets careless, or hasn't had experience, his film may have a belly through the middle to annoy the printer; a variation in thickness that makes good printing impossible and is the bane of the electronic sealing machine operator; a stretch that interferes with handling and measuring; a finish that is too rough, too smooth, or too foggy; and many other imperfections that drive technicians to the aspirin bottle.

This article is designed to tell something about some of the equipment used by the technicians and the painstaking efforts taken to provide a vinyl film or sheet which can be handled by fabricators with little trouble and which will please the consumer because of its quality and appearance.

Key machine for producing vinyl film and sheet is the calender, a giant mass of iron and steel parts so cleverly and accurately assembled that tolerances in the 0.010-in. range can often be met in both machine fittings and in the product made on the machine. The amount of film that can be produced on one of these calenders borders on the fantastic. The latest models are reported capable of producing 4-mil film at a rate of from 80 to 100 yd. a minute. At such speed a calender would consume 30 lb. of vinyl compound a min. and could easily use up 8 million lb. a year when operating under normal conditions. There are only a very few of these latest models in operation, but their very existence gives an indication of what can be expected in the future.



Z TYPE CALENDER

COURTESY FARREL-BIRMINGHAM CO., INC.

Four-roll Z unit with built-in device for crossing roll axes to compensate for roll deflection. Pipe lines are for flood-lubricating and cooling systems

It is estimated that about 110 calenders of all types are running primarily on vinyl film, sheeting, and coated fabrics today. Some of them run part time on rubber sheeting, but that difference is easily made up by a few calenders in rubber plants that run part time on vinyl.

The calenders which were used primarily for film, sheet, and fabric coating consumed approximately 140 million lb. of vinyl compound in 1949.

There are not many more than 55 plants engaged in calendering film and sheet, and many of them have only one calender. Probably 35 manufacturers use 90% of all the vinyl sold for calendering purposes, and of that number, about 10 consume 70% of the resin sold. The impact and breadth of influence exercised by these 55 companies today is indicated by the recent S.P.I. conference on film and sheeting to which representatives of 2500 firms were invited, a preponderant majority of whom were concerned with some aspect of calendered vinyl.

It is not a simple matter to set up a calendering operation. Cost of the calender alone—from $50,000 to $125,000 according to model and size—is only a portion of the capital needed. When all auxiliary equipment is added, total cost frequently amounts to $500,000.

Months are often required to get into operation, even after the calender is set up, in order to make adjustments. Technicians practically live with their machine for weeks after it is installed until they learn every quirk and twist of the complex operation required. Only then can they turn out a film to suit the needs of printers and fabricators.

Before discussing types of calenders, two words frequently used in calender nomenclature should be interpreted for the reader. They are "banks" and "crowns." A bank is the mass of compound rolling in the nip between two rolls. Thus, there is always one less bank than there are rolls on the calender.

The crown is a curved surface

ground or honed on the rolls so that the diameter at the center of the roll at normal temperature is slightly greater than the diameter at the ends. The separating forces created by the rolling bank are so great that they bend the rolls. Proper crowning compensates for this roll deflection so that a uniformly thick sheet can be produced. Crowning is a great bother to all calenderers and many hours of highly efficient labor are required to grind a crown on a roll, but it is only one of the scores of precision jobs required before a calender can be successfully operated.

The size of a calender is designated by the size of its rolls. Thus the L calender shown would be classified as a 92-in. calender which is the width of its rolls. The calenders pictured here are large sizes and can be used for 72-in. wide material. What has come to be known as standard size is a 66-in. roll on which 54-in. wide goods are produced—most printers and fabricators are better prepared to handle the 54-in. material. The 72-in. material is suitable for shower curtains and can be slit to the 36-in. width.

There are two types of calenders now in use. Oldest is the three-roll converted rubber calender where the three rolls are set in the frame one above the other. The other kind, the four-roll calenders, are classified as the inverted L (shortened to L in general parlance) and the Z types, so named because the rolls are positioned in the frame in the shape of those letters. The drawings shown here portray their set up.

The vinyl calendering industry began operating largely with three-roll calenders because they were available. About half of present-day calenders operating on vinyl are in this category. Generally speaking, they operate at a slower speed than four-roll machines on thin-gage film, but that is no hard and fast rule. Operators who have both three- and four-roll calenders are inclined to use the three-roll machine for sheeting or fabric coating and the four-roll calender for film. Probably 75 to 80 per cent of calendered vinyl products are now produced on four-roll machines.

Since a three-roll machine has only two banks of compound, the material obviously receives less working or smoothing out, and the operator finds it more difficult to obtain uniformity in the film. This problem is more acute in film than in sheet material over 10 mils thick. A softer compound containing low melt resins and slower speed are used to meet this situation.

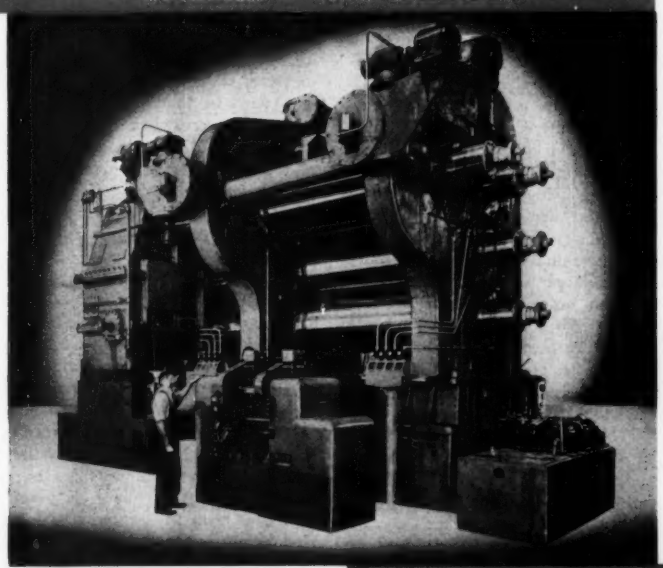
There has been a decided trend toward four-roll calenders since the end of the war. Most of the operators say that the reasons are more precision, better heat control, increased volume.

Heat Control

Heat control of both the calender and the vinyl compound has become an unbelievably complicated art in calendering operations. The metal frame of a calender may reach a temperature of over 200° F., and deviations naturally result in metal contraction or expansion. The temperature of the rolls, of the journal boxes, of the compound itself, all vary and must be coordinated or the product will be ruined. One manufacturer states that for every 100° difference in temperature, the 12-ft. high frame will expand 0.086 in., which is a tremendous factor to overcome on a machine where the operator is attempting to hold 0.0002-in. tolerances.

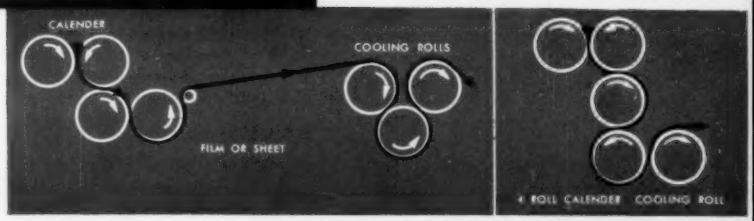
The heart of the heat problem is the vinyl compound itself. The temperature of the film during its

INVERTED L TYPE CALENDER

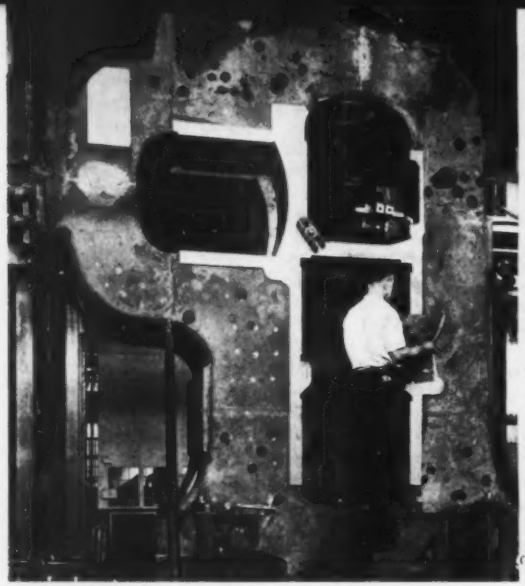


COURTESY ADAMSON UNITED CO.

One of largest L types, with 36- by 92-in. rolls, has roller bearings, automatic cooling and lubricating devices, pull-back units

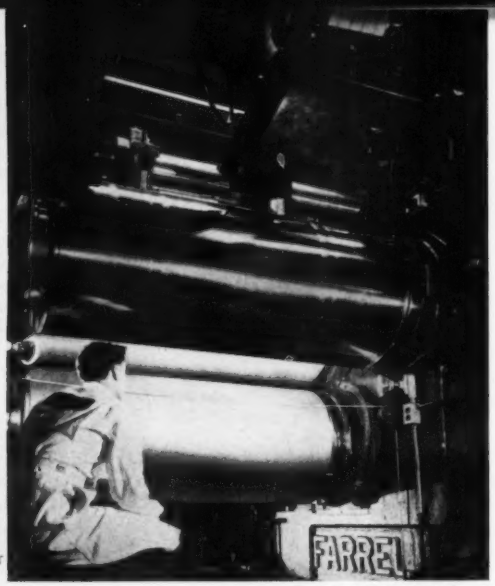


Calendering and cooling rolls for Z (left) and L-type (right) units, showing flow of stock



COURTESY FARREL-BIRMINGHAM CO., INC.

One side of frame for inverted L-type calender with windows for four 32-in rolls. This frame part weighs 32,000 pounds



COURTESY FIRESTONE PLASTICS CO.

Looking up from beneath the huge rolls of a newly designed Z-type machine used for calendering vinyl film and sheeting

passage around the bottom roll may be anywhere from 325° F. depending upon the speed of operation, thickness, technique, type of compounding, and the kind of resin used (almost every resin on the market processes at a different temperature). Once the proper temperature has been determined by trial and error methods, there must be little deviation from the degree of heat established. A difference of 5° would be fatal. But the feed stock going onto the first roll is often 20° cooler than the compound on the bottom roll. The temperature on the other rolls depends upon the operator's know-how in determining what will give the best result for the particular product he is running. The temperature on any two rolls is seldom the same and, consequently, each must be separately controlled.

The heat generated in the compound itself from pressure and working makes heat control doubly difficult. For example, the oil pumped into the bearing boxes goes in at from 130 to 140° F. and comes out at around 180°. The temperature of the bearing box may be 220° and the journal within the box may be 320°. Other heat variations on various parts of the machine must be coped with, and calender manufacturers as well as instrument manufacturers have resorted to many stratagems in order to overcome these problems.

One of the greatest advances in heat control has been the recent development of drilled rolls which are now going into nearly all new calenders. Since the temperature in a bank of compound often rises to 350° when vinyl film is running at 50 yd. a min., water under pressure is circulated in the roll at around 300° in order to help reduce the compound's temperature. Formerly rolls were chamber bored in order to permit steam circulation. The new rolls are straight bored through the center and then drilled with 1 or 1½-in. diameter holes that are spaced at intervals to run longitudinally through the shell just beneath the outside surface. The drilled holes bring the coolant closer to the surface and distribute it the full length of the roll. The total internal surface area available for heat transfer in the new drilled roll is more than double the area in the old-type chamber-bored roll.

Eliminating Vibration

Another difficult problem in manufacturing or operating a calender is the elimination of vibration at high speeds. A thousandth of an inch out-of-line movement in a bearing can seriously affect the uniformity of a piece of film that is only 0.004 in. thick. As the need for close tolerances has increased, so has the size of the calender. The big new Z's for instance, weigh 100 tons; a bearing box alone weighs about 2000 lb.; a roll with both boxes weighs from 6 to 9 tons. The most common size for rolls used for vinyl film or sheet today is 24-in. diameter for L's and 28-in. for Z's, but there are a few L's that are 32 and 36 inches. The bigger they are, the more pressure can be applied.

Obviously a machine of such size geared for precision work at high speed requires all sorts of precautions to obtain smooth operation. One of the latest improvements to relieve the strain caused by vibration has been the construction of a separate housing for the drive and gears that motivate the rolls.

Another precaution centers around construction of the bearings. Theoretically at least, roller bearings require less power, and manufacturers claim that a properly fitted roller bearing will minimize the "play" in a journal box. Advocates for the sleeve bearing, which is simply a bronze lining from ¾

to 1 in. thick located in the bearing box where the neck of the roll revolves, declare it is less complicated than roller bearings and can be depended upon for precision performance because it is so easily adapted to temperature and metal-expansion problems. Sleeve bearings also permit use of a larger journal on the roll thus giving strength and stiffness to the roll itself.

In addition, a hydraulic pull-back cylinder connected to the bearing is an aid toward eliminating backlash in the adjusting mechanism and in assuring the proper seating of the roll journal in the journal box at all times.

Arguments fly thick and fast over the relative merits of these two different bearing constructions; they are cited briefly here only to point out a highly technical problem on which thousands of dollars and hundreds of hours of research have been spent in order to build a machine on which a product costing only a few cents a yd. can be made.

Care of the Rolls

Perhaps the most interesting spot on a calender to the man who buys film coming off the calender is that crown on the roll mentioned before. Unless the crown is just right, the film will either be corrugated or tend to belly and become the abomination of all printers and electronic sealing-machine operators. The approximate crown on a 24-in. diameter, 66-in. roll which produces a 54-in. sheet is 0.0035 in. for 4-mil film. The wider and thinner the sheet, the higher the crown. If a 20-mil thick sheet is to be formed, the crown need be only 0.001 inch. Furthermore, once a roll is ground or honed for a 3.2-mil film, it isn't desirable to use it for 8-mil without rehoning to make a new crown. For producing thin film, rolls are generally ground for one thickness and seldom operated for film of any other gage that varies from that thickness by more than 1 or 2 mils.

In running thicknesses of from 10 to 20 mils, it is not generally necessary to change the crown. That explains why operators usually use one calender for thin film and another for thick. It also explains why a man with only one calender generally concentrates on producing either film or sheet. Of course he can have different sets of rolls, but it's an expensive process to change from one to the other.

Two or three weeks are frequently required to grind or hone a crown. Honing is done on the calender—when grinding is necessary the rolls must be removed from the stack. When honed in the plant a triangular carborundum block is inserted between the rolls which are slowly turned, and only minute amounts are taken off until the properly contoured surface is obtained. Specially skilled mechanics are generally hired for the job. The cost may run from a few hundred to several thousand dollars, depending upon the condition of the rolls. Because of this expense, it is easy to understand why a calenderer doesn't offer many different gages of film to his customer. In fact, it is probable that more rolls are reground because of damage from metal particles that get into the compound or by damage inflicted from "frosting" than because the owner wants to vary his production. This fact also tells why a detector is frequently employed in the compounding line before the vinyl material reaches the calender.

Calender operators were optimistic for a time when a method for crossing rolls at the axes was provided on the new model calenders. It was thought that this process would eliminate the necessity for honing crowns or, at least, make it possible to go from a 4- to an 8-mil film without grinding a new crown.

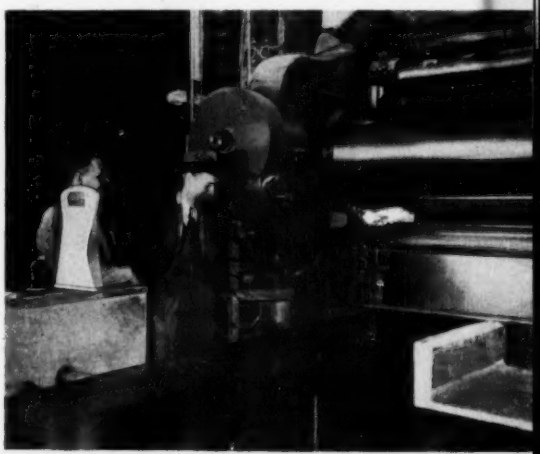
When two rolls are crossed, the roll surfaces at the centerline of the calender retain their relative positions, whereas the roll surfaces at the ends of the roll move apart from each other, thus producing the equivalent of a crown. On the latest machines, the rolls are crossed by raising one end of the roll and lowering the other by motor power and an adjustment screw. But experience so far doesn't indicate that hand crowning can be completely eliminated. A crossed-roll crown does help to eliminate the hump in the middle of the film, but doesn't entirely do away with thickness at the ends.

The last two rolls on most calenders are generally finished with a matte surface or frosting. The matte is a minute depression made in the surface of the rolls by running emery paper or a plastic-carborundum mix through the rolls under pressure every week. The frosted finish is necessary to give the satin feel desired by most film users.

Auxiliary Equipment

After film or sheet comes from the calender, at near 350°F., it must be cooled to 100° or so before it can be wound up. Furthermore, certain formulation ingredients used in the compound as well as the matte surface may cause the film or sheet to stick to the bottom roll so that it rides high on the roll and is

(*Continued on p. 168*)



COURTESY THE LANDERS CORP.

Coated fabric is automatically weighed as it comes off calender to assure even distribution of coating compound. Note rollers at lower left connected by a delicate mechanism to weighing scales above the rolls

Handbags are

COURTESY HERCULES POWDER CO.

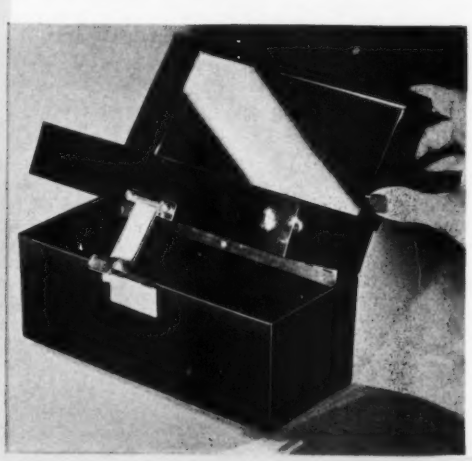
Striking styles, rich colors, and lustrous finishes characterize virtually unbreakable handbags molded of cellulose acetate

PLASTICS have often been used to mold handles and frames for ladies' handbags; again, plastics have been widely applied in the fabrication of complete handbags in various sizes, styles, and shapes. Now plastics—and cellulose acetate in particular—have come into fashion in another way, thanks to a trend toward small box-like bags. The economies of injection molding, the wide range of colors available in molding materials, and the almost unlimited variety of shapes which can be designed, make thermoplastics a natural in this field. In addition, the bags can be made strong yet light in weight, and large enough to hold the ordinary complement of feminine equipment.

All of the bags shown have the plastic advantages of being easy to keep clean and of withstanding the effects of weather. In many cases the lustrous surface of the molded plastic is used as interior finish; in other cases, an added touch of luxury is provided by linings of moire, velvet, and other fabrics. Most bags include built-in mirrors.

One line of molded bags, pro-

Roomy double-decker handbag provides ample space in shallow upper tier and large bottom compartment to hold the usual allowance of feminine accessories



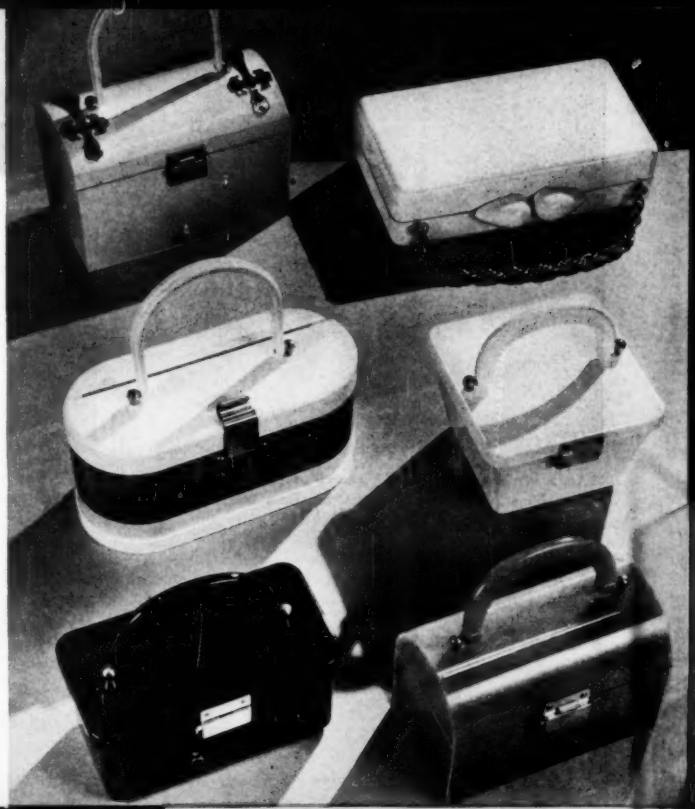
COURTESY TENNESSEE EASTMAN CORP.

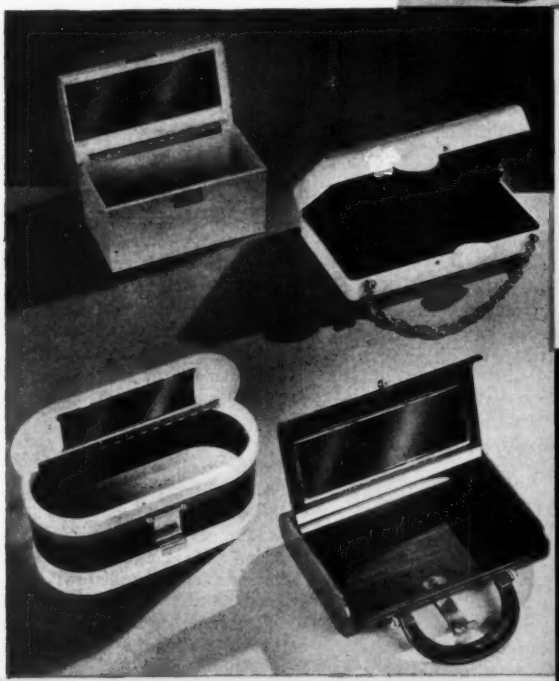
Above: Tortoise-shell color, pattern, texture, and feel are simulated in Maxim's cellulose acetate bag

Molded

duced by Hardy Plastics & Chemical Corp., Brooklyn, N. Y., includes styles ranging from simple rectangular boxes to a multi-color design in which the lid, handle, and base are of white cellulose acetate, with molded bands of blue, red, yellow, and green cemented together to make up the sides. Another Hardy bag is composed of three sections—a lid and two compartments—all hinged together and with two fasteners to give access to either top or bottom compartments. In all the Hardy bags, the mirrors are positioned by molded-in lugs and are held in place by cementing.

Another striking bag by Maxim is molded of acetate by The Bolta Co. of Lawrence, Mass. The latch consists of two round knobs which snap-fit together and are held securely by a tiny nipple-and-dimple arrangement.



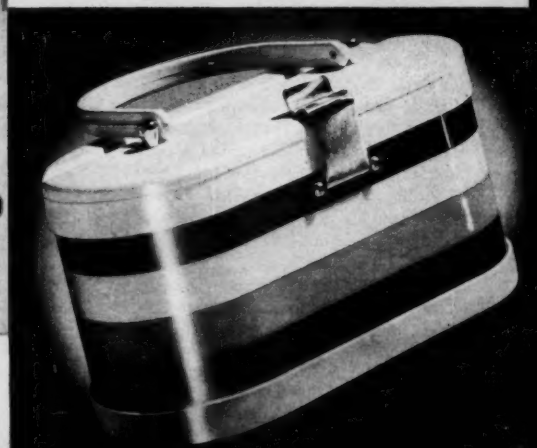


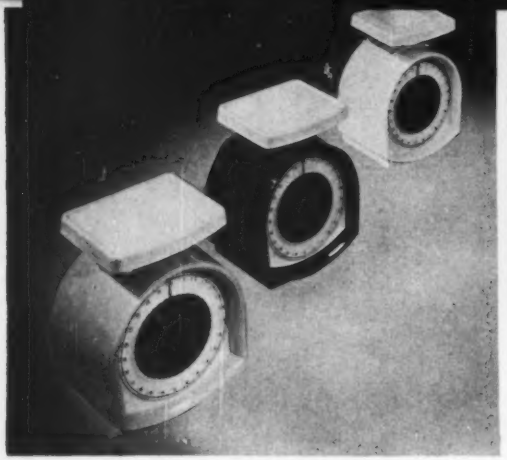
Above: Cellulose acetate handbags come in many sizes and shapes—are weather resistant and easily cleaned

Left: Wide-opening bags have interiors finished with plastic or luxury fabrics. Most units have mirrors

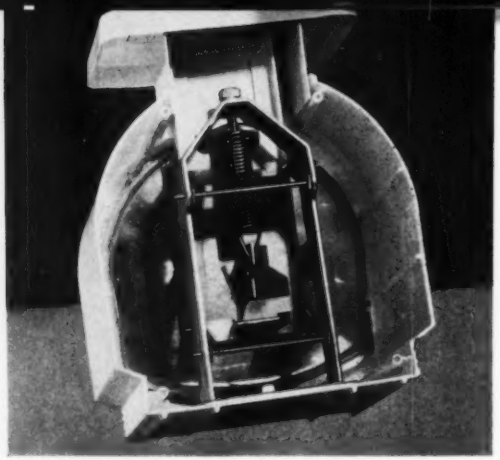
Below: Colored acetate bands are cemented together to form bag sides. Lid, handle, and base are white

COURTESY TENNESSEE EASTMAN CORP.





Styrene kitchen-scale housing comes in yellow, red, and white. New design divorces all strain from housing itself



Rear view with back removed shows molded ribs which give housing added strength. Back is anchored to cored bosses

Kitchen Scales Go Modern

Redesign involved change from metal to styrene housing; styling and production time advantages have accrued

MODERN design—in the form of a one-piece molded styrene housing—has finally caught up with the old household kitchen scale, transforming it into a product of functional beauty which fits perfectly into today's modern kitchen. Introduced by Pelouze Mfg. Co., Evanston, Ill., which has been making quality scales since 1894, the new plastic housing supersedes a complicated sheet metal construction, reducing assembly time and providing a more efficient, attractive product.

When Pelouze officials decided to modernize their scale line, no halfway measures were tolerated. A clean break with previous styling and construction was authorized in order to bring the scales into conformity with latest styling trends and to take full advantage of the design possibilities inherent in molded plastics. The industrial design firm of Palma-Knapp Associates, Chicago, was called in to design and engineer the new scale, which was to have fewer parts and to be easier to assemble and calibrate than the old style scale.

Actually, the Pelouze household scale is only the first of a series of scales which will utilize the new styrene housing. This popular unit is offered in white, red, and yellow to harmonize with modern kitchen decorating schemes; in grey for the 5-, 10-, 15- and 25-lb. parcel post scales; and in white for the dietetic and ice cream over-run scales (percentage of over-run air content). In the future, other new scale models will use the same housing, which will be combined with appropriate dial calibrations for the particular end use to be served.

Too Many Parts

Among the major disadvantages of the former scale were the large number of parts requiring finishing and assembly and certain structural features which have been improved in the new model. The former scale contained 42 parts, including five in the housing alone. The unit was held together by means of metal tabs or ears, inserted through slots and twisted. The scale mechanism itself was suspended from the back of the assembly.

The base of the previous scale, being formed of sheet steel, was subject to deflection under heavy loads, which interfered with correct readings. Because of the construction involved, the scale required tedious adjustments on the final inspection, thus slowing production. In addition, the applied finish of the metal parts wore off in service.

Number of Parts Reduced

Pooling their efforts with those of Palma-Knapp, Pelouze technicians re-engineered the new scale from the ground up. In the redesigned scale, the entire operating mechanism is suspended within a sturdy die-cast aluminum chassis which mounts directly to the flat bottom of the housing by means of four bolts. Component parts were

reduced from 42 to 29. The unit is now engineered so that even under heavy loads, none of the pressure is exerted upon the plastic housing in such a manner as to set up strain or deflection. This feature not only affords greater design latitude, but also results in more accurate readings, since the mechanism is virtually divorced from the housing.

How this has been accomplished is illustrated in an accompanying photo which shows the rear of the scale with the sheet metal back removed. It may be seen that any weight applied to the scale is transmitted, via the chassis, directly down to the two load-carrying ribs or runners in the base of the housing, which are immediately below the vertical columns of the casting. Even a weight of 50 lb. would place no direct deflection-producing strain upon the housing.

Stiffening Ribs Used

The same photograph also brings out other important design features. The rigidity of the styrene housing, with an average wall thickness of approximately 1/16 in., derives largely from the carefully engineered use of stiffening ribs extending from front to back. Altogether, there are 12 such ribs, including four exterior ribs on the base, four others which are cored to accept the screws which hold the back in place, and two supplementary internal ribs on each side wall.

The sheet metal back itself, which fastens to the housing by means of self-threading screws, adds further to the strength of the plastic shell. The eight internal ribs are recessed slightly to provide a stop for the back, seating it flush with the edges of the molded housing. Further strength is provided by the fluted design of the base of the housing and the low "collar" at the top of the piece, through which the platform support passes.

The one-piece plastic housing replaces five pieces in the previous model—the base, wrap-around, cover plate, dial support, and bezel ring for the dial window. On the kitchen scale, it is used in conjunction with a newly designed dial which includes graduations by ounces up to 25 lb., as well as a floral basket motif and a handy table of weight equivalents to simplify measurement of butter, sugar, etc. This material is screened on the back of the glass dial window.

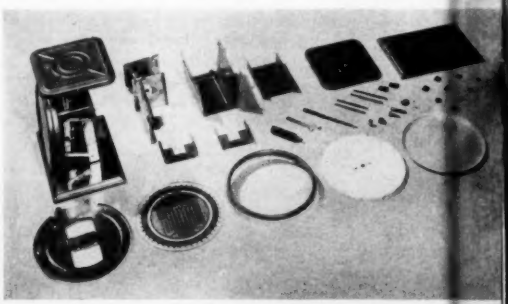
With the new design and construction, it is possible to have models with capacities of from 1 to 50 lb. without deflection and consequent inaccurate scale readings. Stepping up the capacity of the scale to 50 lb. will be accomplished by using a heavier spring. With the new design, it is believed that production per day per worker will be at least 200% and possibly 300% higher than former production, with rejects and adjustments at the final checking stage greatly reduced.

Molded of Styrene

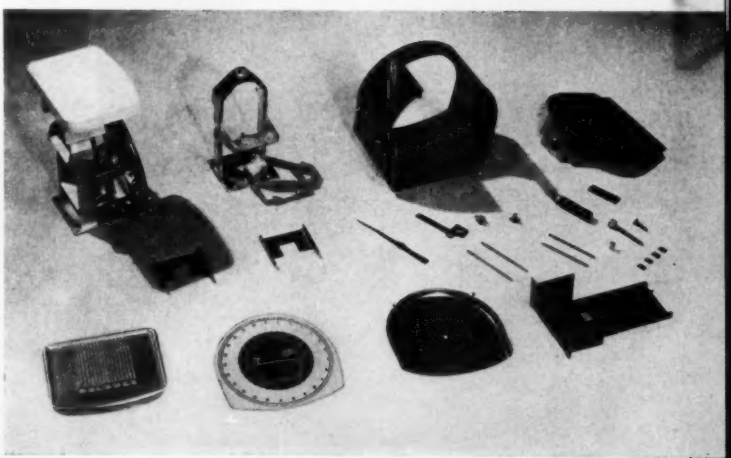
The Pelouze scale housing is produced by Chicago Die Mold Corp., Chicago, of high-impact, heat-resistant Koppers styrene, in a single cavity die on a 12-oz. Watson-Stillman or HPM injection press. Selection of styrene followed the determination that satisfactory impact characteristics could be obtained in this material. Due consideration was also given to the favorable cost factor, as well as the surface finish of the casting and the form retention properties of styrene under elevated temperatures. It is pointed out that scales and similar products are often exposed to direct sunlight in enclosed display windows, where high temperatures may be built up during the summer months.

The Pelouze housing is center-sprued and carries a spider-type gate which insures rapid distribution of material and eliminates weld lines. The principal problem of the molder was to obtain good flow which would provide the proper fiber arrangement for superior impact characteristics. This goal was attained by working out the details for proper gate and runner arrangement.

Old scale with a metal housing had 42 parts, required time-consuming assembly. The base deflected under loads



Parts are reduced to 29 in new scale with molded styrene case. Single-piece housing replaces five metal components



PLASTICS

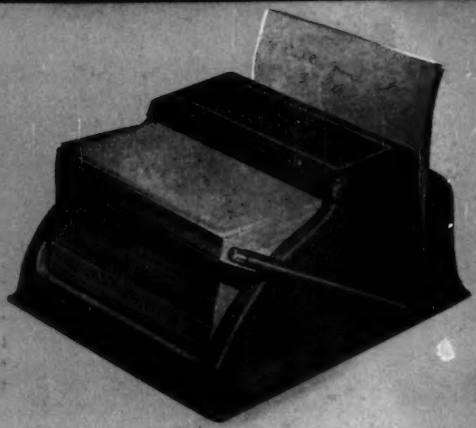
Two-tiered Tid-Bit Tray consists of 14-in. long oval platter and 5⅞-in. diameter plate, both molded of melamine. Chrome handle and rod can be unscrewed to disassemble unit for flat storage. Available colors are blue, coral, yellow, gray, deep green, and sand. Molded by Watertown Mfg. Co., Watertown, Conn. Sold by George E. Weigl Co., 230 Fifth Ave., N. Y.

Table service molded of nylon has high impact resistance and withstands heat of over 500° F. Pieces can be cleaned in dishwasher without damage. Set, available in five pastel shades, includes plates, cups, saucers, tumblers, serving bowls, cereal bowls, bread plates. Made by Gits Molding Corp., 4600 W. Huron St., Chicago, Ill.

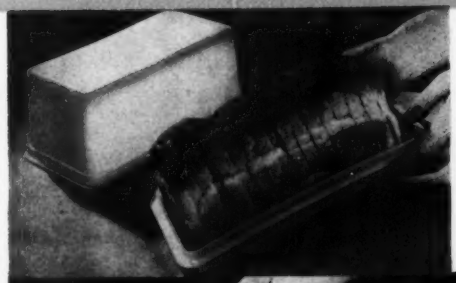
Utility cream or syrup server, molded of styrene in two parts, is first all-plastic pitcher with metal spring cutoff to prevent dripping. Decorative colored band, which covers and strengthens cemented joint between the parts, comes in red, blue, green, or yellow. Body is transparent styrene. Server is produced by California Moulders, Inc., 814 E. 29th St., Los Angeles 11, Calif.

Drink stirrer with a humorous twist makes a whistling sound when blown. Called Wh'stler's Muddler, it has a red-striped white acetate stem topped off with a red siren. Gift appeal is provided by styrene package holding six stirrers. Bar accessory, enabling drinker to "whistle for more," is made by Manchester Molding Co., Manchester Depot, Vt.

PRODUCTS

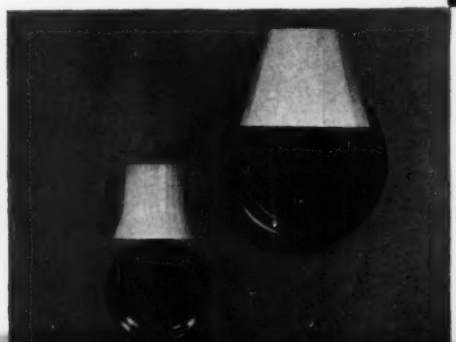


Magnetic memo box, with rear rack for notes, is formed of Royalite copolymer sheet material. Called Side-Kick, Jr., and produced in eight colors, the scuff-proof box holds 700 memo sheets, 4 by 4 inches. Automatic pencil in matching color is held to box by built-in magnet. Made by The American Binder Co., Inc., 230 Teaffe Pl., Brooklyn 5, N. Y.



Bread and sandwiches are kept fresh and sanitary in this server made of flexible Bakelite polyethylene. Latest addition to Tupperware line holds a standard 16-oz. commercial loaf—is also useful as a refrigerator container for vegetables. Odorless, tasteless, and non-toxic, the bread server has an air- and odor-tight tray cover. Produced by Tupper Corp., Farnumsville, Mass.

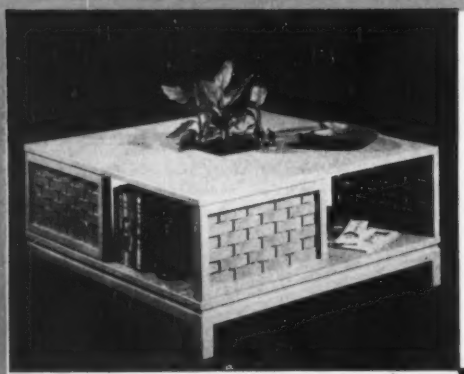
Streamlined toy speedboat molded of red Lumarith cellulose acetate has outboard motor which propels boat rapidly and will run for a long distance. Tough, shatterproof, resilient plastic enables toy to withstand bumps and knocks. By positioning the rudder, boat can be made to go right, left, in a circle, or straight ahead. Manufactured by Ideal Novelty & Toy Co., 23-10 43rd Ave., Hollis, N. Y.



Pin-up lamp for kitchen, dinette, rumpus room, or cottage consists of cup, saucer, and plate, made of Monsanto styrene, with stainless steel spoon used as bracket to hold up saucer. Large size has 9½-in. plate; small lamp, with cup handle on left or right for mounting in pairs, is made with 6-in. bread and butter plate. Available colors are red, blue, yellow, and green. Lamp produced by Pato Industries, Laconia, N. H.

PLASTICS

Table mats combining the practical advantages of plastic with the attractive textured appearance of fabric, cord, or hemp are made of 28-gage vinyl sheeting. Called Plastimats, they are produced by a deep embossing process. Table mats measure 12 by 18 in., are available in varied colors, need no laundering or ironing, will not slide on the table, and will not crack, tear, or wrinkle. Matching coasters are also available. Plastimats are made by Hedwin Corp., 1525 W. 41st St., Baltimore 11, Md.



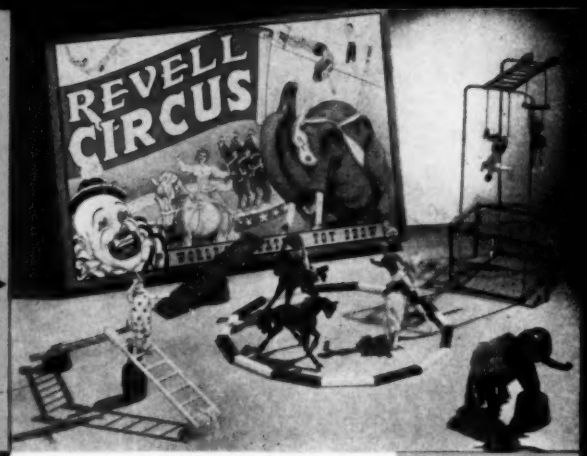
Decorative panels of planter cocktail table are made up of strips of Tenite II cellulose acetate butyrate extruded by Schwab & Frank Inc., 2937 E. Warren Ave., Detroit, Mich. The strips are hand-woven through vertical wooden bars in four frames which are positioned around the table base as supports for the top. The strips are durable; the surface is chip-proof. Table is made by Marcek Furniture Div., Central Parlor Frame Mfg. Co., 1311 W. 47th St., Chicago, Ill.

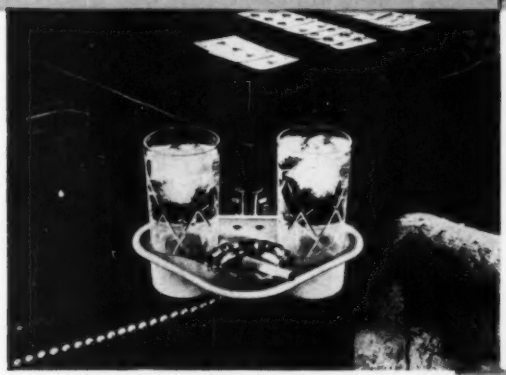
Vinyl Shower Aid, with pockets for bathing accessories, eliminates bending and reaching, thus reducing accidents. Holder, produced in clear film, is furnished complete with two shower curtain hooks. Drainage holes in pockets keep water from collecting. Aid manufactured by Lynn Mfg. Co., 224 S. Colony St., Wallingford, Conn.

Phenolic poker chip rack dispenses five chips of the color selected when one of the three knobs on top is flipped, thus saving counting and errors. Grooves hold 280 chips and two packs of cards. Made by H & V Specialties, 1242 Gilman Ave., San Francisco 24, Calif.

PRODUCTS

Realism is attained in the Revell Deluxe Circus Set by articulated animals and performers which can be positioned to stand, run, sit, ride, or climb on ladders and other props. Flexibility comes from ball-and-socket joints held together by rubber bands. Animals and performers are molded of acetate, props are styrene, clothing is vinyl. Made by Precision Specialties, Inc., 212 N. Western Ave., Los Angeles 4, Calif.





Confusion at the card table caused by glasses, ash trays, etc., is eliminated by Card Partner trays, molded of Lustrex styrene, which clamp to the table leg out of the way, below the table level. Trays come in sets of two, and each holds two glasses or bottles and an ash tray. Produced in *House & Garden* decorator colors by The Monogram Glass Co., Inc., 2100 Greenleaf St., Evanston, Ill.

Golf bag of Lumite woven saran fabric weighs only 6½ lb., has embossed natural russet leather trim. Dark-green herringbone material is long wearing and water-proof. Produced by Burton Mfg. Co., Jasper, Ala.

Zipout shrimp cleaner is molded in one piece of red Tenite II cellulose acetate butyrate by Globe Imperial Corp., Rockford, Ill. Sturdy, corrosion- and water-proof cleaner consists of handle tapered to a point for insertion under shrimp shell. Made by Arthur Paoli & Son, 2042 N. 2nd St., Rockford, Ill.

SPECIFY

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Slush Molding Vinyl Plastisols

by EUGENE B. GREENSPUN†

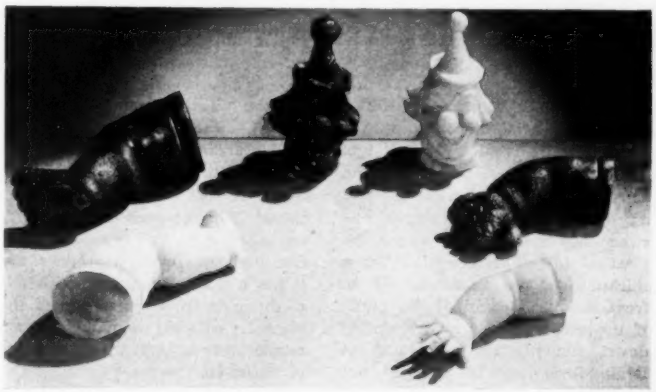
SLUSH molding of vinyl plastisols to produce hollow, flexible articles offers a number of advantages. Such articles can be produced from inexpensive molds in relatively large quantities if desired, duplicate molds are readily made, and the molding equipment is comparatively simple.

First real impetus was given to slush molding just a few years ago by a realization of its applicability to the doll industry. The material used was such that arms and legs for dolls produced from it would be superior in feel, texture, and strength to doll parts made of rubber latex such as had already been on the market for many years.

Rubber molding of certain doll parts has always had a number of drawbacks. In order to mold rubber parts, complete redesign is often necessary so that the piece can be removed from the mold and core. With slush molding, design changes necessitated in rubber because of reverse undercuts are entirely eliminated. Also, many items that are technically impossible to manufacture in rubber, or uneconomical because of cost, are now entirely feasible in vinyl by slush molding.

The vinyl plastisol used in a given slush molding job will depend upon the molder's technique as well as upon the design of the finished piece. Variations in shape and size and wall section will call for formulations ranging in viscosity from 2700 to 8000 centipoises. For example, if the finished piece is to have a wall thickness of 3/16 in., an 8000 centipoise plastisol will be required; a wall section of 1/32 in. will call for a 2700 centipoise plastisol.

Briefly stated, slush molding consists of producing the desired thickness of plastic material on the inside wall of a mold, curing the plastic, and then removing the finished part from the mold without distortion or tearing. In the molding of rubber latex, the material is coagulated chemically and then cured. With a plastisol, the vinyl resin is coagulated or partially cured by applying oven heat quickly and



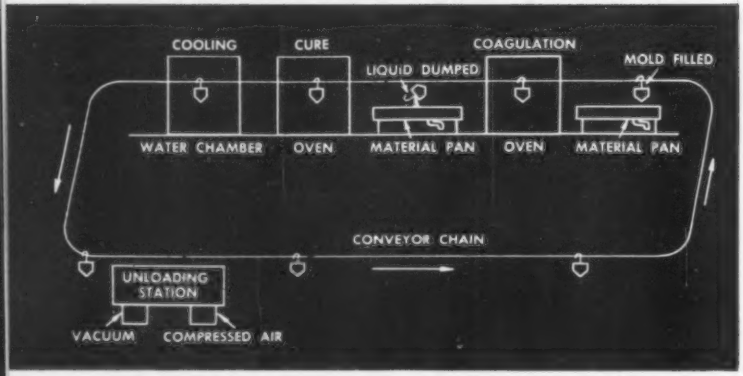
COURTESY GENEVE MFG. CORP.

Examples of pieces produced by slush casting and molds used. Molds are built up by electroforming layers of silver, nickel, and copper over wax

Hollow, flexible slush molded articles, produced in flesh-colored material, before decorating. Paint will be applied to fingernails, cheeks, hats, etc.

COURTESY GENEVE MFG. CORP.

*Reg. U. S. Pat. Office.
†President, Geneve Mfg. Corp., Trenton, N. J.



Schematic diagram of a conveyorized slush molding set-up. Variable speed chain drive, oven thermostats, and cooling water controls are desirable

evenly to all sections of the mold. Final curing takes place in a second oven.

Conveyorized Operation

In practice, the molds are usually placed on a conveyor belt having positions for as many molds as the operator wants to run. The plastisol material is poured into a mold until it is filled to the top. This mold is then placed on the conveyor belt and carried through an oven where temperatures between 500 and 600° F. cause the plastisol to jell or coagulate for a thickness of approximately 1/16 in. from the inside wall of the mold. If the mold is now turned upside down, the plastisol remaining in liquid form will be dumped out while the coagulated material will remain in place. The mold is then carried to the second oven where the coagulated part is completely cured. Passage through a cooling chamber cools the mold sufficiently to remove the finished piece. Removal of the finished piece from the mold is accomplished by blowing it out with compressed air or collapsing it with vacuum. Whichever system is used, the part is easily and quickly removed.

It is advisable to provide a camacting arrangement in the second oven which will slowly revolve the molds so that an even cure is obtained. With an oven designed with two open ends, this is essential because all the oven heat does not follow a circulating pattern; it tends to dissipate from either end of the oven. By rotating the mold, an even temperature is built up on all sides of the mold.

Molding Variables

The thickness of the mold has a direct relationship to the thickness of the vinyl piece being molded. Also, the length of time a mold is kept in the oven has a direct relationship to the thickness of the mold and the thickness of the piece being molded. If the piece is to have a thin wall section—say approximately 1/32 in. thick—a thick mold is required, and the pass through the oven is quite rapid. If a thick-section piece is to be made, then the mold should be thin, and its travel through the oven should be slow.

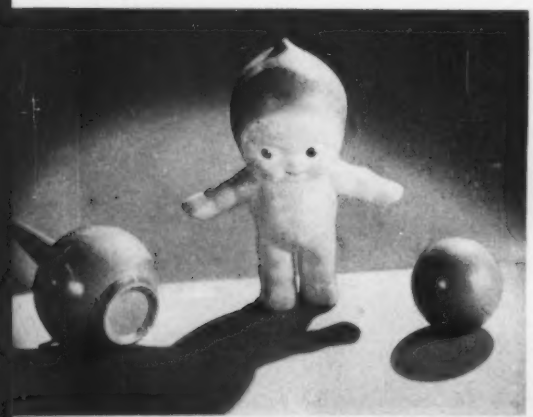
Temperature in the oven will vary anywhere from 350 to 600° F., depending on the total quantity of material being run through the oven at a given time. If small objects about the size of a thumb are being run, then the ovens would be set at 350°. If parts the size of a human head are being run, then the oven would be set at approximately 600°. The molder must determine how many pounds of plastisol and how many pounds of molds go through the oven in an hour; then the oven temperature must be set accordingly. A miscalculation will result in undercured or overcured pieces.

The accompanying sketch shows a typical conveyorized slush-molding system which operates continuously, the empty molds being returned to the mold-filling operator. The two tanks of material shown must be arranged so that they can be removed quickly and reversed in position; when the first tank is empty, the second one is inserted to take its place. Also, arrangements must be made to replenish the liquid plastisol as it is consumed.

Such a machine should have a variable drive so that the operator

Long-lived syringe, Kewpie doll, and play ball point up wide range of products possible by slush molding

COURTESY MOLDED LATEX PRODUCTS, INC.



By adding simple cloth dresses to slush molded heads, low cost puppets are produced that have high play value

COURTESY GENEVE MFG. CORP.

REVLON CHOOSES PLASKON...

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Smart white caps—soft pink pastel tray—created of smooth lustrous, non-fading Plaskon Molded Color—was selected by Revlon to stop shoppers . . . convert them to buyers.

The range of colors—from white through gay pastels to jet black—is only one of the reasons Plaskon thermosetting molding compounds were chosen.

Plaskon's easy moldability—its resistance to the effects of grease, alcohol and solvents—its economy—are reasons for its wide acceptance in the drug trade field.

A Plaskon representative is ready to show you how you can dramatize your product. He'll be glad to talk to you and your molder any time. Why not call him today—he may have suggestions of real and immediate value to you.

The pastel pink tray molded by Boonton Molding Co., Boonton, N. J. The white closures were molded by Armstrong Cork Co., Lancaster, Pa.

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS CO.
2121 Sylvan Avenue • Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston • Chicago • Los Angeles • New York • Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

PLASKON
MOLDED COLOR

COURTESY ARROW RUBBER & PLASTIC CORP.

Doll parts offer greatest present market for slush-molded pieces, but industrial uses are growing. Ring (upper right) is used in electronics work

COURTESY AMERICAN ANODE INC.

Plastisol lamp base has fine detail, smooth surface, good color

can adjust the speed for different molding conditions. Likewise, the ovens should be thermostatically controlled, and individually controllable water jets should be provided in the cooling chamber. Increasing the amount of water cools the molds quickly; decreasing the amount of water cools the molds more slowly. For a small molded object the water should be cut down; for a larger object—which requires more cooling—the water jets are opened wider.

Compressed air and vacuum equipment serves to remove the pieces from the molds. Relatively simple parts can be blown out by compressed air; if the piece is difficult to remove, a vacuum will collapse the material from the mold walls.

Sampling Markets

Slush molding makes it possible quickly and economically to produce a finished plastic sample of an engineer's or designer's brainchild. Slush molding thus gives an opportunity to try out new ideas by means of sample pieces made quickly and inexpensively. Such sample pieces can be submitted to prospective customers for approval or design change.

Here's how this aspect of slush molding is worked out in our company: When a customer comes to us with an idea, his drawing or sketch goes to an artist familiar with slush-molding work. A model is made which, upon the customer's approval, is transferred into wax. The charge for the conversion into wax is usually about $25. The wax is then electro-plated by a mold maker who has a standard fee of $25 for the first mold. From this mold a dozen or so samples are made for the customer. From these samples he can either secure orders or fit it into his end product as an integral unit.

If the item sells slowly, the mold is put into service and scheduled to produce say, 500 parts per week. If, however, the customer requires 5000 pieces per week, 10 duplicate molds are ordered. These additional molds cost anywhere from $5 to $15 each, depending on size. With a total plant capacity of approximately 36,000 pieces a day, it is possible by ordering additional molds to supply almost any customer in sufficient quantity to meet ordinary demands.

How Molds Are Made

The first molds for this work are made by electro-forming over wax, the first layer being silver, the second nickel, and the third copper. The electro-forming is carried out until the total mold wall thickness is around 1/16 inch. After the electro-forming is completed the wax is melted out. If additional molds are required, a number of vinyl parts are produced from the initial mold, on which the mold maker electro-forms duplicate molds which are identical with the original. In this case, because the vinyl form is flexible, it is easily removed by collapsing it.

The physical qualities of slush molded plastisol are such that it is possible to do exceptionally accurate work. Because the material is not cured under pressure, it exhibits practically no shrinkage when molded. Colors are almost unlimited. Plastisol can be cemented and heat-sealed, and its strength is far superior to that of rubber. Slush-molded vinyl chloride is unaffected by most acids, sunlight, aging, and a wide range of solvents. The molded material can be flexed as much if not more than most natural or synthetic rubbers. It is non-toxic and therefore is well adapted for use in children's toys. It has excellent electrical insulation properties and will not support combustion.

100% Plastic

With all these desirable advantages—economic as well as physical—it is not beyond reason to believe that a new era has begun in the plastic field whereby a plastic that is 100% plastic and not synthetic rubber can and will invade and probably replace many applications where, heretofore, rubber was used only because there was nothing else to substitute in its place.

Eighty-Two Pounds Every Six Minutes

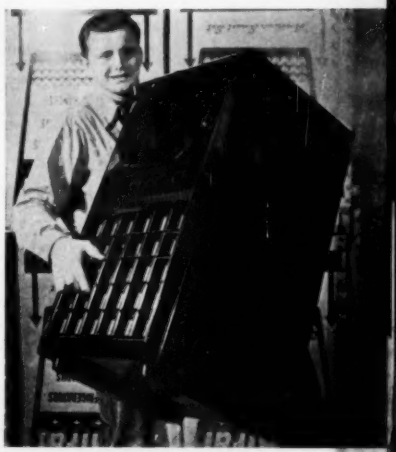
Fast acting compression press, plus high frequency preheating, plus special molding material, speeds production of large television console cabinets

ONCE again molded television console cabinets are making compression-molding history. In July 1949, MODERN PLASTICS reported the first such console produced by Molded Products Corp., Chicago, Ill., and designed by Admiral for a 10-in. picture tube; in April 1950 came a description of the first console for a 12½-in. tube; and now Admiral is producing a 16-in. receiver housed in a one-piece molded console cabinet. At the time the cabinet for the 12½-in. set was reported, it was being molded in a single-cavity mold; today it is being molded in a two-cavity mold. The cabinet for the 16-in. set also started as a one-cavity job and is now run in two-cavity operation.

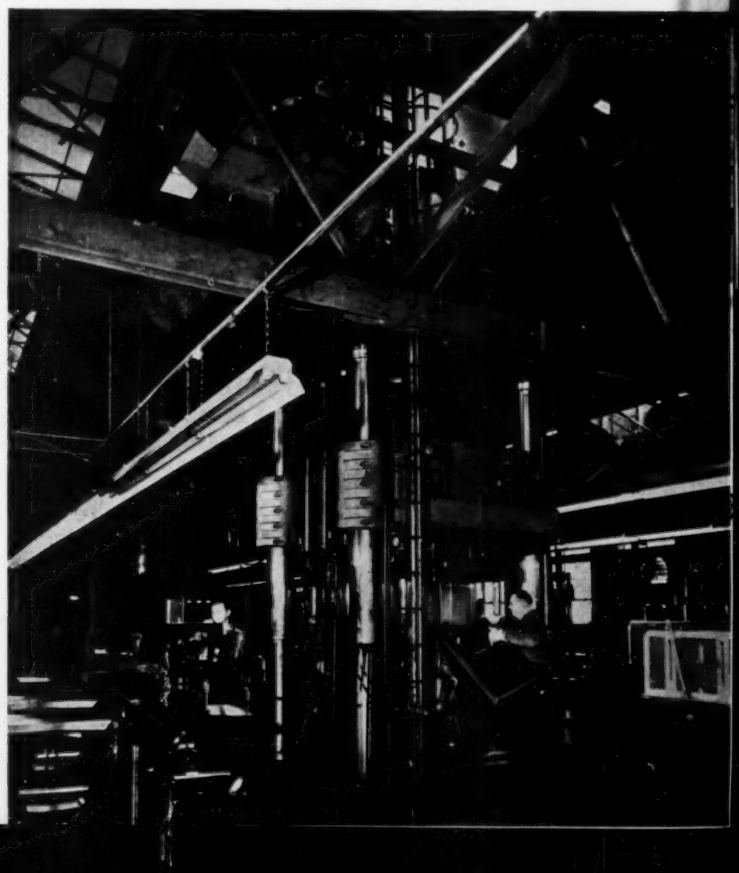
While the market for television sets is astronomical, competition has made selling price a matter of paramount importance. Since the cost of the cabinet has a marked effect on the retail price of the set, it is necessary that the molder not only produce an attractive and sturdy cabinet, but also that it be produced as economically as possible.

Molds are expensive, especially those of the type used on the Admiral jobs by Molded Products Corp., which are machined with such precision that the cut-off is perfect, leaving only wafer-thin flash on the parting line and fragile fins in the openings. This extra cost, however, is especially well spent when the molds are for high-production runs; then the savings in finishing costs alone soon equal the added tool costs and from then on are profit.

Another factor in the economics of molding is the speed and efficiency of the press. Two 2500-ton downward-acting HPM presses are installed in this molder's plant, and each press is handling two cabinets per shot with 2200 tons pressure. A large pre-fill tank mounted atop each press contributes to the speed of closure—a total of only 18 sec. is required for the two force plugs to travel a distance of about 40 in., "dwell" on the material, and then fully close. The pre-forms are preheated to about 250° F. in two Westinghouse 30 k.w. high-frequency units before they are loaded into the cavities. The cure time is 4½ min. and the over-all cycle—which includes removing the molded parts,



COURTESY THE HYDRAULIC PRESS MFG. CO.
Cabinet with fins removed, ready for the television components



COURTESY THE HYDRAULIC PRESS MFG. CO.
Cabinet molding press with a Westinghouse pre-heater at the right

Promoted to the head of its class!

dinnerware molded of MELMAC® Plastic

Molded MELMAC entered the dinnerware class only a few years ago.

At that time it was unknown to mass feeding establishments, retail buyers and consumers... having only seen service in the armed forces during the last war.

Today... thanks to the untiring efforts of molders and Cyanamid's continuous promotion in retail, institutional, restaurant and consumer publications... MELMAC dinnerware is firmly established in restaurants, hospitals, schools, colleges and homes.

During the past two years MELMAC dinnerware consumer advertising has appeared in such publications as SATURDAY EVENING POST, GOOD HOUSEKEEPING, HOUSE & GARDEN, NEW YORK TIMES MAGAZINE, FARM JOURNAL, HOUSE BEAUTIFUL and LIVING.

Cyanamid's new color-sound motion picture, "The Bull in the Melmac Shop," is being widely shown to help molders help retailers to sell MELMAC dinnerware to more and more consumers.

These promotional assists are typical of the full cooperation that Cyanamid's Plastics Department provides molders and manufacturers to help build profitable new markets.

Perhaps we can help *you*. Get in touch with us now—even if your wonderful new product or market is only in the "idea" stage. Write to AMERICAN CYANAMID COMPANY, Plastics Department, 32 Rockefeller Plaza, New York 20, N. Y.

Photo by Dixon

"Everybody welcomes this idea!"

A NEW IDEA in dinnerware is being given a hearty welcome in thousands of American homes!

This new dinnerware is made of MELMAC® plastic, a remarkable material developed by American Cyanamid Company. It is unbelievably resistant to breakage. It has a colorful, lustrous beauty all its own. It fits perfectly into modern ideas for living and entertaining. And it is delightfully light and easy to care for.

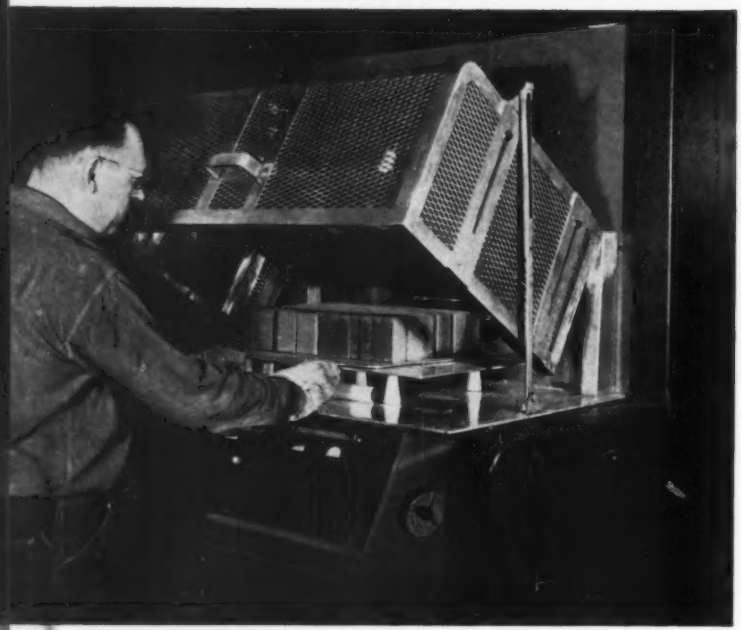
Plastic manufacturers throughout the country are now producing MELMAC tableware in a variety of smart colors and designs. Its durability and lasting beauty have already been proven by use in many famous hotels and smart restaurants.

MELMAC plastic is one of several interesting and versatile molding compounds developed by Cyanamid for the molding industry—to bring new standards of quality and value to scores of everyday products.

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Materials for the Plastics Industry — one of the many industries served by Cyanamid



COURTESY THE HYDRAULIC PRESS MFG. CO.

Large brick-shaped pre-forms for the television cabinet molding job, ready for removal from the high-frequency pre-heater, shown with its safety guard raised

Placing pre-heated pre-forms in the mold cavity of one of the 2500-ton presses. Retracted force plugs are shown immediately above the cavities

COURTESY MOLDED PRODUCTS CORP.

cleaning out the mold, loading the pre-forms, closing the mold, in addition to cure—is 6 minutes.

The 16-in. console cabinet measures 34 in. high by 18 in. wide by 18¾ in. deep and weighs about 41 lb., with the 12½-in. being only slightly smaller in depth. Each mold measures about 29 by 41 by 54 inches. This means that when two molds are mounted in one press the total platen area must be large enough to accommodate an area 29 by 82 in.

Everything about these jobs is large, even the pre-forms being substantially larger than ordinary building bricks, with 13 pre-forms required for each cabinet. Both the force plugs and cavity are cored for steam. With a steam pressure of 100 p.s.i. on the force plug and 130 p.s.i. on the cavity, a uniform temperature of 320° F. is maintained on both.

Although the 2500-ton presses used for these jobs are gigantic, they would be nowhere near large enough, except for the fact that a special long-draw phenolic is used, furnished by Plastics Engineering Co., Sheboygan, Wis., and the pre-forms are pre-heated by high frequency. Only for these reasons is it possible for the molder to close two such large molds with but 2200 tons pressure.

Calculating Molding Pressure

As is usual in many engineering phases of the plastics industry, there are no precise tables or formulas which are known to give exact pressure requirements for all sizes or shapes of compression molded parts. One rule-of-thumb formula has been used for years with full realization that it has many limitations, but at least it does give an indication of pressure requirements. In the hands of an expert engineer having many years of experience in calculating such data, it can be used as a starting point, after which adjustments can be made according to past experience with parts having similarities in depth of draw, wall thickness, amount and direction of taper, type and flow of resin, as well as the kind of pre-heating to be used. This formula is:

$$P = A_v + \tfrac{1}{2}A_p$$

where P equals pressure required to close in tons, A_v equals area in

sq. in. of part vertical to molding pressure, and A_p equals area in sq. in. of part parallel to molding pressure.

Considering that the 16-in. cabinet has a draw of 18½ in., no adjustment from the calculated result need be made to compensate for the long-draw characteristics of the phenolic material used. In other words, the longer and easier flow of the material is counter-balanced by the very deep draw. Because of the wall section of ¼ in. (sufficiently thick for good flow) and because there is no reverse taper on the vertical walls, no adjustment need be made for these factors. Theoretically, these cabinets have been designed for optimum molding conditions, and the only adjustment necessary in calculation relates directly to the softness of the preforms due to HF pre-heating. Calculating without this adjustment for a cabinet measuring 34 by 18 by 18¾ in., with the 18¾-in. dimension being depth of draw, indicates the following:

$A_v = 612$ sq. in.; $A_p = 1950$ sq. in. (area outside wall) plus 335 sq. in. (area chassis supporting shelf), or A_p equals a total of 2285 sq. inches. Substituting in the formula:

$P = 612 + (½)\ 2285 = 1745$ tons

Because two molds are mounted in each press, the total calculated closing pressure without pre-heating comes to about 3490 tons. However, only 2200 tons are actually needed for mold closing. Hence it can be seen that if high frequency pre-heating were not used on this job a press approximately 60% larger would have been required.

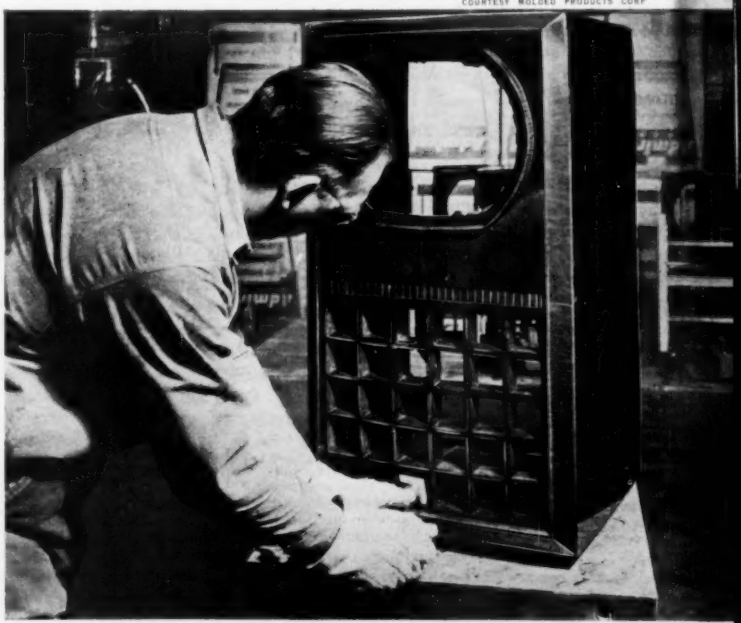
A concrete example of pressure-reducing advantages offered by high-frequency pre-heating in compression molding can be had by comparing the 82-lb. shot described above with a compression molded child's coffin which was made in England some time ago. The coffin weighed 80 lb. and hence from a molding standpoint the two jobs are entirely comparable. In the coffin job no pre-heat was applied to the molding material and a 4000-ton press was required for satisfactory production. Without any question, the major reason for the high molding pressure required was the lack of pre-heat.

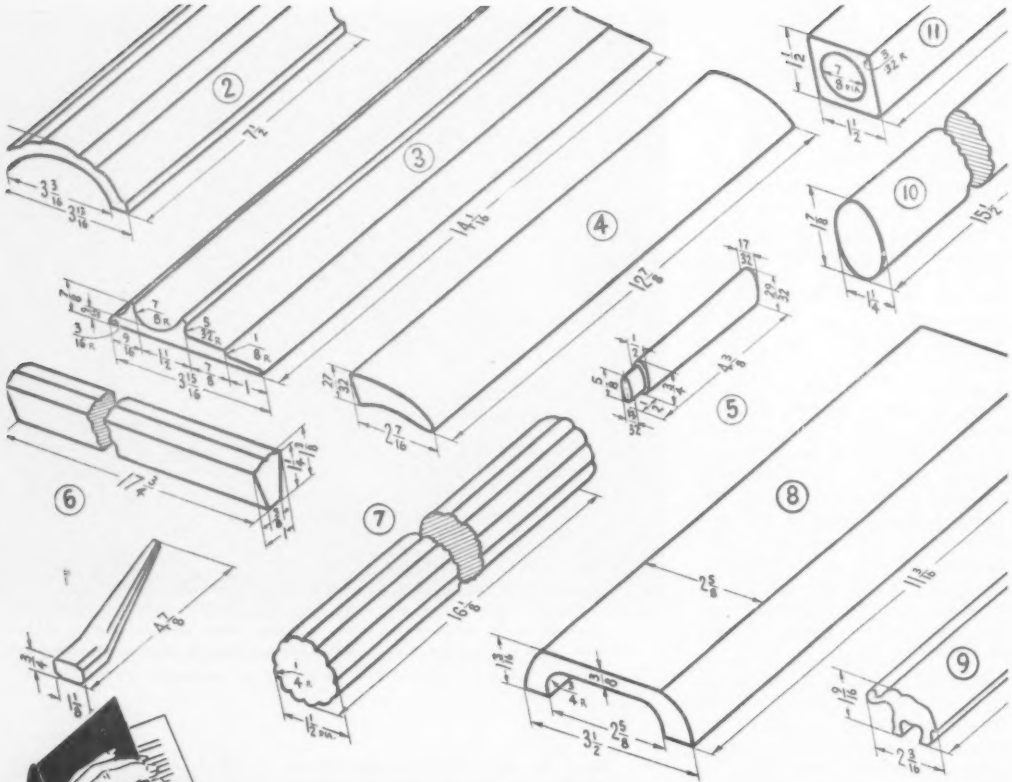
COURTESY THE HYDRAULIC PRESS MFG. CO.

Cabinets being removed from the molding press. One cabinet is taken from each side of the press; second cabinet can be seen at right center

Molds for the television cabinet job are machined so precisely that fins are thin and fragile. Finishing operations are thus reduced to a minimum

COURTESY MOLDED PRODUCTS CORP





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Flexible Plastic Table-Top Materials

by H. J. STARK† AND A. W. CIZEK, JR.†

This article discusses the results of laboratory tests performed on three grades of linoleum covered by Navy specifications and 12 different commercial materials now being used or proposed for use as table-top coverings. The significant general conclusion drawn is that thin compounded vinyl sheeting materials as a group are equal to linoleum in most of the properties investigated. A reduction in weight of table coverings of approximately 65% may be obtained by using thin vinyl sheeting in place of desk top linoleum. The results of over a year's service test aboard a naval carrier indicate the material to be performing satisfactorily.

AN investigative program, underway for the past two years under the sponsorship of the Navy Bureau of Ships' Plastics Section, had as its objective the development of a suitable light-weight covering for the tops of the mess tables and benches in place of desk-top linoleum. Desk-top linoleum, the covering currently in use aboard Naval vessels, has rendered serviceable performance in the past. But in such major considerations as light weight, high frictional factors, and high resistance to abrasion, indentation, impact, and strong alkali, it was the belief of the Bureau of Ships that a commercially manufactured plastic or elastomer might be found superior to desk top linoleum. To this end the study has been directed.

As in most instances where a material is to be used in service aboard ship, the requirements under such conditions are considerably more exacting and rigorous than those which may be required for a similar material developed primarily for industrial or domestic application. Consequently, in planning the investigation, it was the purpose of the Bureau of Ships, and the Material Laboratory, where the laboratory phase of the program was conducted, to devise or to select a series of tests incorporating methods which would most effectively measure or evaluate the suitability of the materials for the specific Naval use as a mess table top and bench covering. While accuracy and reproducibility of results are prime requisites of any test method, the methods devised, and those that were selected or modified from applicable Government specifications, were chosen for the investigation with a view toward an economy of time, effort, and cost.

Some phases of the investigation were inherently qualitative and subjective in nature, such as the evaluation for resistance to cigarette burns or the suitability of the material as writing surface. (Mess tables are frequently used by the ship's personnel in off-duty hours on which to write letters to the folks at home). It was determined that properties of this nature could be adequately checked by the Material Laboratory engineering staff based on their previous experiences in laboratory testing of like materials under similar service conditions.

Representative types of nearly all the commercial table-top materials were examined under this program. Fifteen materials have been investigated at the Material Laboratory. These include a rigid paper-base phenolic laminate with a thin aluminum sheet insert, and flexible coverings such as battleship linoleum (3)[1], desk-top linoleum (4), fire-retardant battleship linoleum (5), an unsaturated polyester, vinyl sheetings of various types of manufacture, several trowel-on type plastic metal compounds, and two neoprene elastomers.

Discussion of Results

The results of all tests are shown in Table I which permits ready comparison of the properties of the various materials.

Rigid Paper-Base Phenolic Laminate—Tests on the laminate were completed early in the investigation. The outstanding property of the material was its resistance to cigarette burning and freedom from any damage to the surface as a result of pressing lighted cigarettes into the surface. The covering was resistant to ignition and burning and was negligibly affected by strong alkali. Its frictional properties were poor as was anticipated. The angle of slide was 10° as compared with 30° for desk-top linoleum.[2] Weaknesses of the material were lack of impact resistance and shatterproofness. A ½-lb. steel ball dropped from heights as low as 6 in. produced bad cracks on the under

*Reg. U. S. Pat. Office.
†Bureau of Ships, Department of the Navy.

[1]Numbers in parentheses refer to the specifications listed in the references at the end of this article.
[2]Bureau of Ships Standard Plan for Mess Table and Bench requires the use of 0.080-in. thick desk-top linoleum.

Table I.—Properties of Table-Top Materials

Property	Rigid paper base phenolic laminate	Battleship linoleum, Fed. Spec. LLL-L-351a, 1/8 in. thick	Battleship linoleum, Fed. Spec. LLL-L-351a, 3/16 in. thick	Desk-top linoleum, Fed. Spec. LLL-L-354, 1/16 in. thick	Fire-retardant Battleship linoleum, Navy Spec. 27L12a, 1/8 in. thick	Unsaturated polyester
1. Weight, lb./sq. yd.	4.08	7.47	11.18	4.44	12.90	3.60
2. Specific gravity	1.49	1.40	1.34	1.26	2.57	1.09
3. Thickness, in.	0.061	0.127	0.192	0.079	0.129	0.069
4. Resistance to impact	See remarks below on shatterproofness	Slight indentation	Slight indentation	Slightly cracked at point of impact	Seriously indented; cracks 1 in. in radius from point of impact	Slight crack at point of impact
5. Residual indentation						
a. 4800 p.s.i. load, %	....	14.5	7.5	5.1	4.5	<1.0
b. 6000 p.s.i. load, %	....	15.0	14.0	7.1	27.6	<1.0
6. Shatterproofness	Material badly cracked under surface	No surface failure	No surface failure	No surface failure	No surface failure	No surface failure
7. Taber abrasion (a)						
a. Weight loss, g.	0.099	0.356	0.763	1.143	0.825	0.131
b. Volume loss, cc.	....	0.254	0.569	0.907	0.322	0.121
8. Wear resistance, in.	0.009	0.015	0.017	0.005	0.014	0.001

9. Bonding strength																	
Cement *	A	B	C	D	E	F	D	E	F	D	E	F	D	E	F	D	F	G
a. 24 hr. drying, lb.	....	....	....	31.0	21.6	6.7	24.1	61.3	20.9	37.9	35.9	1.2	33.2	103.6	9.6	41.7	1.5	30.2
b. 48 hr. drying, lb.	....	....	....	88.0	28.0	13.9	96.7	109.0	23.4	98.5	29.3	3.2	72.5	117.9	15.5	45.5(c)	3.8	32.8
c. Above + 2 hr. in water at 120° F., lb.	....	....	....	30.5	0.4	0.0	28.5	3.1	0.0	46.2	24.3	0.0	39.6	8.9	0.0	21.0(c)	3.1	27.9
d. 168 hr. drying, lb.	272(b)	228(b)	192(b)	146.8	98.2	35.0	144.6	131.4	44.9	149.7	112.0	31.0	167.4	145.6	43.4	....	....	....

10. Water absorption		With backing	Backing removed	With backing	Backing removed	With backing	Backing removed	With backing	Backing removed	
a. Gain in weight, %	3.16	7.27	2.19	1.50	1.45	6.27	3.41	<1.0	<1.0	<1.0
b. Deterioration noted	....	None	None	None	None	None	None	None	None	None
11. Hot water test										
a. Gain in weight, %	2.02	15.2	12.5	3.7	3.1	13.8	13.4	2.0	1.5	<1.0
b. Deterioration noted	Blistering	None	None	None	None	None	None	None	None	None
12. Angle of slide										
a. Angle of slide	10.0°	20.0°		18.0°		30.0°		22.0°		61.0°
b. Coefficient of friction	0.17	0.36		0.32		0.57		0.39		1.87
13. Flammability (f)										
a. Benzene drop	No ignition	No ignition		No ignition		No ignition		No ignition		Burned entirely
b. Wooden match	No ignition	Burned entirely		Burned entirely		Burned entirely		Self-extinguishing		Burned entirely
14. Cigarette burn test	No effect	Black stains; removable		Black stains; removable		Black stains; removable		Slight brown stains; removable		Brown-black stains not removable
15. Writing surface	Satisfactory	Satisfactory		Satisfactory		Satisfactory		Satisfactory		Satisfactory
16. Solubility										
a. 50% ethyl alcohol, %	Negligibly affected	—0.48		—0.19		—0.35		—0.03		+0.11
b. 10% acetic acid, %	Negligibly affected	—1.51		—0.90		—2.04		—0.55		—0.08
c. 10% sodium hydroxide, %	Negligibly affected	—44.80		—67.61		—96.10		—11.77		None
d. 10% citric acid, %	Negligibly affected	—0.84		—0.64		—1.32		—0.71		—0.13
e. 28% ammonium hydroxide, %	Negligibly affected	—0.21		—0.21		—0.28		—0.05		—0.04
f. Milk, %	Negligibly affected	—0.79		—0.07		—0.68		None		—0.16
g. Coffee, %	Negligibly affected	—0.73		—0.07		—0.63		—0.05		—0.09
h. Tea, %	Negligibly affected	—0.78		None		—0.59		—0.04		—0.14
i. 5% iodine in alcohol, %	Negligibly affected	+1.62(g)		+0.02(g)		+5.75(g)		+0.52(g)		+5.34(g)
17. Resistance to food stains										
a. Mustard	No stain	No stain		No stain		No stain		No stain		Vivid yellow stain
b. Catsup	No stain	No stain		No stain		No stain		No stain		Slight stain

Notes: (a) After 5000 rev. in Taber Abraser. (b) After 144 hr. drying time. (c) Failure occurred within the material itself. (d) After 168 hr. drying time and 2 hr. immersion in water at 120° F. (e) Coefficient of friction determined on both surfaces. (f) On specimens not attached to aluminum panels. (g) Specimens showed considerable discoloration and brittleness. (h) Specimens darkened considerably. (i) Specimens were stained yellow-green color.

Table I.—Properties of Table Top-Materials (Continued)

Property	Vinyl coating A	Vinyl coating B	Vinyl coating C	Vinyl coating D	Plastic metal compound A	Plastic metal compound B	Plastic metal compound C	Neoprene A, 1/32 in. thick	Neoprene B, 1/16 in. thick
1. Weight, lb./sq. yd.	1.37	4.45	2.25	1.62	1.55	2.76	3.67	2.19	3.39
2. Specific gravity	1.28	1.54	1.24	1.36	1.12	1.43	1.28	1.33	1.33
3. Thickness, in.	0.025	0.062	0.044	0.100	0.028	0.042	0.060	0.045	0.069
4. Resistance to impact	Puncture 1/8 in. radius from point of impact	Slight indentation	Puncture 1/16 in. radius from point of impact	Puncture 1/8 in. radius from point of impact	Puncture 1/8 in. radius from point of impact	Puncture 1/4 in. radius from point of impact	Puncture 1/8 in. radius from point of impact	Puncture 1/16 in. radius from point of impact	Puncture 1/16 in. radius from point of impact
5. Residual indentation									
a. 4800 p.s.i. load, %	<1.0	<1.0	3.2	<1.0	.....	.....	.....	7.1	3.6
b. 6000 p.s.i. load, %	<1.0	<1.0	4.2	<1.0	.....	.....	.....	9.8	4.4
6. Shatterproofness	No surface failure	No surface failure	No surface failure	No surface failure	No surface failure	No surface failure	No surface failure	No surface failure	No surface failure
7. Taber abrasion (a)									
a. Weight loss, g.	0.073	0.436	0.025	0.023	0.345	0.423	0.308	0.068	0.071
b. Volume loss, cc.	0.057	0.283	0.020	0.017	0.308	0.296	0.241	0.051	0.053
8. Wear resistance, in.	0.001	0.004	0.001	0.001	0.005	0.017	0.023	0.001	0.001
9. Bonding strength									
Cement	D	G	H	D	G	H	G	H	I				E	E
a. 24 hr. drying, lb.	55.2	77.2	41.1	76.1	89.3	42.4	166.9	144.4	7.4	.....	.....	.....	82.5	61.1
b. 48 hr. drying, lb.	68.1	57.1	54.3	102.1	127.0	64.6	213.6	79.4	8.1	.....	.....	.....	62.5	41.8
c. Above + 2 hr. in water at 120° F., lb.	31.5	52.2	36.6	36.2	27.8	31.7	55.7	37.5	11.0	.....	.....	.....	40.7	20.5
d. 168 hr. drying, lb.	....	....	....	....	....	....	....	....	...	.....	.....	.....	183.6;101.4(d)	102.9;36.3(d)
10. Water absorption				With backing	Backing removed						With backing	Backing removed	With backing	Backing removed
a. Gain in weight, %	6.3	<1.0	16.0	....	2.4	6.3	1.3	3.5	22.6	....	12.4	....
b. Deterioration noted	None	None	None	....	None	None	None	None	None	....	None	....
11. Hot water test														
a. Gain in weight, %	8.3	1.2	17.6	4.7	6.5	68.3	40.3	32.8	25.3	11.3	18.8	10.4
b. Deterioration noted	None	None	None	None	None	Large blisters; pinholes	Large blisters	Large blisters	None	None	None	None
12. Angle of slide		Glossy(e)	Dull(e)									
a. Angle of slide	25.0°	19.0°	18.5°	43.0°	40.0°	20.0°	16.0°	12.0°		18.0°		14.0°
b. Coefficient of friction	0.46	0.35	0.34	0.94	0.84	0.36	0.28	0.21		0.33		0.24
13. Flammability (f)														
a. Benzene drop	No ignition	No ignition	No ignition	No ignition	No ignition	No ignition	No ignition	No ignition		No ignition		No ignition
b. Wooden match	Self-extinguishing	Self-extinguishing	Self-extinguishing	Self-extinguishing	No ignition	No ignition	No ignition			Self-extinguishing		Self-extinguishing
14. Cigarette burn test	Deep yellow stains; not removable	Deep yellow stains; not removable	Slight damage; stains removable	Dark brown stains; not removable	Deep yellow stains; not removable	Deep yellow stains; not removable	Deep yellow stains; not removable			Slight stain		Slight stain
15. Writing surface	Satisfactory	Satisfactory	Unsatisfactory because of the irregularly embossed surface	Satisfactory	Unsatisfactory	Unsatisfactory	Unsatisfactory			Satisfactory		Satisfactory
16. Solubility														
a. 50% ethyl alcohol, %	—0.53	—0.03	—0.71	—1.10	+0.07	+0.2	+0.6			—0.83		—0.37
b. 10% acetic acid, %	—0.52	None	—0.33	None	+0.5	+0.1	+0.6			+0.17		—0.05
c. 10% sodium hydroxide, %	—0.73	—0.03	+0.84	+0.20	+18.1	+12.7	+29.3			+2.24		+4.07
d. 10% citric acid, %	—0.41	None	+0.19	+0.09	+0.3	+0.1	+0.4			—1.36		—0.35
e. 28% ammonium hydroxide, %	—0.61	None	—0.39	None	+1.5	+0.4	+0.9			+1.17		+1.09
f. Milk, %	—0.42	None	+0.07	+0.08	+0.5	+0.1	+0.5			—0.85		—0.04
g. Coffee, %	—0.41	None	—0.19	+0.18	+0.7	+0.1	+0.6			—0.11		—0.05
h. Tea, %	—0.41	None	—0.71	+0.09	+0.7	+0.1	+0.5			—0.51		—0.06
i. 5% iodine in alcohol, %	—0.02(h)	+0.13(i)	+5.41(g)	—22.0(g)	—0.5	—0.1	None			+19.40		+5.69
17. Resistance to food stains														
a. Mustard	Deep yellow stain	Slight yellow stain	No stain	No stain	No stain	No stain	No stain			No stain		No stain
b. Catsup	No stain	No stain	No stain	No stain	No stain	No stain	No stain			No stain		No stain

Notes: (a) After 5000 rev. in Taber Abraser. (b) After 144 hr. drying time. (c) Failure occurred within the material itself. (d) After 168 hr. drying time and 2 hr. immersion in water at 120° F. (e) Coefficient of friction determined on both surfaces. (f) On specimens not attached to aluminum panels. (g) Specimens showed considerable discoloration and brittleness. (h) Specimens darkened considerably. (i) Specimens were stained yellow-green color.

surface of the material. As the drop height was increased, much more serious damage resulted. Blisters developed on the upper surface when the material was immersed in boiling water. This material was difficult to handle, owing to the methods and precautions required to cut the rigid sheeting to size, and the complicated method needed to bond the laminate to aluminum because of warpage of the thin sheet. The material is not deemed suitable as a Navy table and bench covering.

Linoleum—Considering the linoleums tested as a group of materials, they do not possess distinguishing properties that make them specifically adaptable for mess table and bench covering aboard ship. They exhibit general properties which, when compared with the other materials tested, such as the vinyls, are average. In weight, the lightest weight linoleum, weighing 4.44 lb. to the sq. yd., was 3½ times heavier than the lightest-weight vinyl, and battleship linoleum (⅛ in. thick) was 5½ times heavier.

Fabricated for use in comparatively large thicknesses, as compared with the vinyls (0.079 in. vs. 0.025 in.), desk-top linoleum showed residual indentation of 5.1 and 7.1. Its resistance to impact was reasonably good. Fire-retardant linoleum, being more brittle, was more seriously indented, with cracks radiating for a distance of 1 in. from the impact center. Battleship linoleum, in 3/16-in. thickness, was in this respect, the best of all the materials examined.

Wear resistance of desk-top linoleum as rated by the Wearometer was approximately three times better than the other grades tested. One vinyl material (B) lost 0.004 in. compared to 0.005 in. for desk-top linoleum. It was apparent, though, that all of the linoleums were conspicuously less wear-resistant than the vinyls and neoprene elastomers.

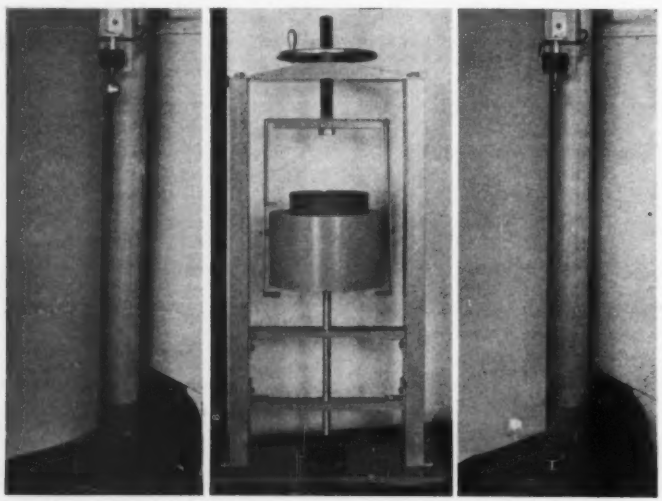
Water absorption appeared reasonably low, and resistance to deterioration and water absorption in the hot water test was good. The frictional surface was average. Desk-top and battleship linoleum burned completely when ignited with a wooden match while fire-retardant linoleum did not ignite nor did it burn. Other materials tested, with one exception, compared favorably with fire-retardant linoleum in this respect. Cigarette burn resistance of the linoleum was about equal with other materials tested. The deterioration of the linoleums in 10% sodium hydroxide was very pronounced.

Unsaturated Polyester—Excellent frictional properties were noted for this covering. With an extremely high angle of slide (61° against 30° for desk-top linoleum), the polyester covering was first among all the materials in this respect. Indentation, shatterproofness, Taber abrasion, wear resistance, water absorption, hot water test, and resistance to strong alkali were all rated high. However, these good properties were over-balanced by flammability and burning characteristics. The material burned completely when subjected to flammability tests, and its resistance to cigarette burns and food stains was low. In addition to this, the material was weak in tensile strength, and low values for adhesion were obtained in tests for bond strength. These deficiencies were considered sufficient to preclude its use for mess table and bench coverings.

Vinyl Coverings of Various Manufacture—The outstanding property of vinyl covering A was that it weighed the least per sq. yd. of all the materials investigated, (1.37 lb. against 4.44 lb. for 1/16 in. desk-top linoleum). The results of examination for resistance to indentation and wear, shatterproofness, bond strength, flammability, alkali and food stains resistance, and suitability as a writing surface showed the vinyl covering to be very satisfactory in these respects. As compared with linoleum the cigarette burn resistance was weak. The frictional surface was rated slightly under desk-top linoleum (25° angle of slide for vinyl A compared with 30° for desk-top linoleum). The relatively high water absorption did not result in any deterioration of the covering, and was not considered as a serious deficiency. The high water absorption may be attributed to a flocking material, keyed to the underside of vinyl, to aid in bonding the covering to aluminum. Vinyl covering A showed generally outstanding properties for table-top and bench covering.

Vinyl covering B showed no particularly outstanding property. While it rated high in impact and indentation resistance, shatterproofness, flammability, resistance to alkali, and as a writing surface, its resistance to abrasion (Taber), wear, and water absorption was better than for the linoleum but not so good as for other vinyls. Its weight per sq. yd. was equal to that of desk-top linoleum but was relatively high when considered with the best

Apparatus used for tests: 1—(left): Equipment for determining resistance to impact; 2—(center): Indentation unit; 3—(right): Shatterproof testing device



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4—Test disks are subjected to wear on wheels of Taber Abraser

of vinyl coverings. In frictional properties (angle of slide, 19°), it was not so good as desk-top linoleum (angle of slide, 30°). In spite of the staining evidenced in the cigarette-burn test and after contact with iodine solution, this material had no serious deficiencies and was considered generally satisfactory.

The third vinyl, vinyl covering C, was among the better materials tested. It was one of the four best materials from the standpoint of resistance to cigarette burning, and rated second in impact resistance. Resistance to Taber abrasion was better than for all but one other covering, and the material was also good in wear resistance. With an angle of slide of 43°, this vinyl covering rated well above desk-top linoleum (30°). However, the surface did not present a good writing surface as it was irregularly embossed. It is questionable whether such a high angle of slide would be obtained if the surface were made smoother. Its weight per sq. yd. was also good (2.25 lb. as opposed to 4.44 lb. for desk-top linoleum). One weakness was in the high water absorption (16.0%) although the material, with the fabric backing removed, showed only 4.7% absorption in the hot water test. The manufacturer stated that this absorption was through the edges which could be sealed with a sealing agent at the time the installation is made. This material was also considered a satisfactory covering.

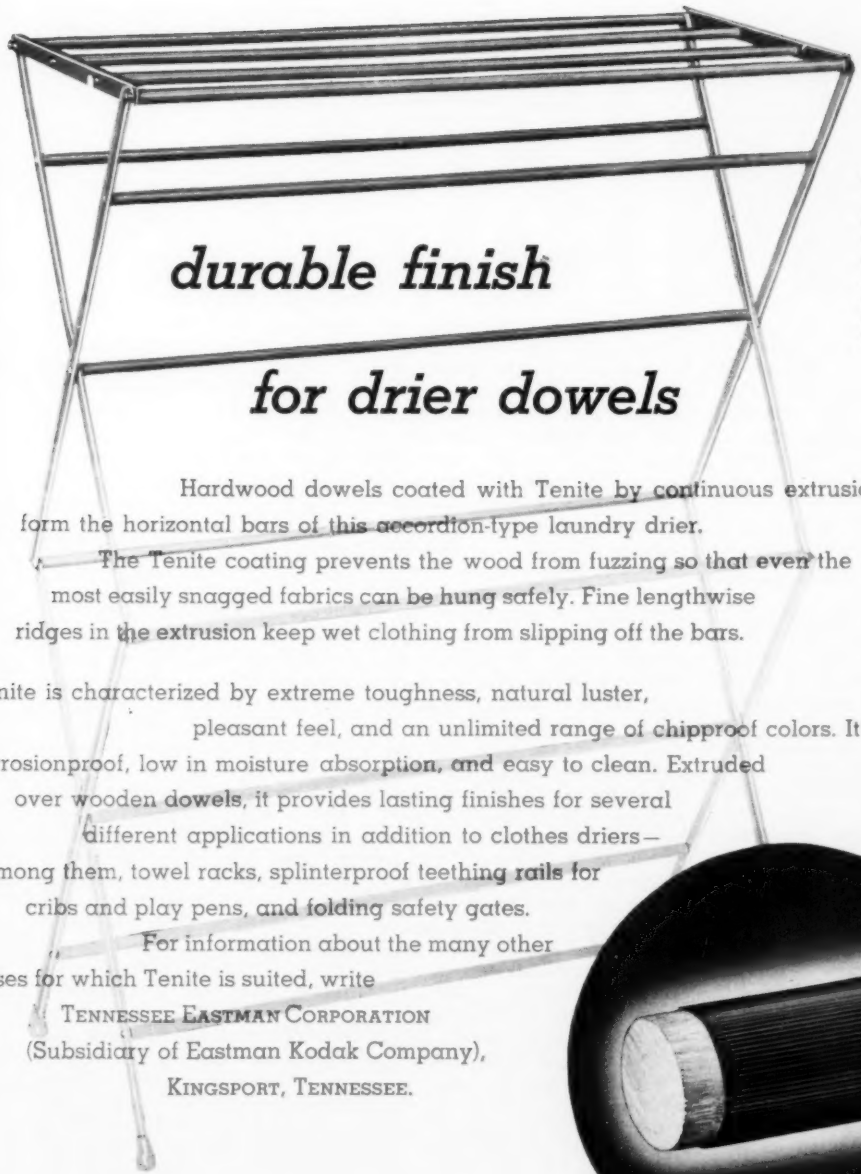
Vinyl covering D, similarly to the other three vinyls, was characteristically light in weight as contrasted with desk-top linoleum (1.62 lb. to 4.44 lb. for desk-top linoleum). In resistance to indentation, impact, wear, and alkali, it was as good as any of the other vinyl coverings, while its resistance to Taber abrasion was the best of all materials investigated. In angle of slide, this covering rated above linoleum (40° compared with 30° for desk-top linoleum). Water absorption in both the water-absorption test and hot-water test was within the range of values obtained for the other vinyls. Although the surface of this covering was embossed, the embossing was not deep enough to impair its serviceability as a writing surface. Its resistance to cigarette burning, food staining, acids, alkali, and organic solvents was on a par with the other vinyls. With regard to flammability, this material was self-extinguishing as compared with linoleums that burned entirely. The most serious objection to this material was the low adhesion when bonded to aluminum with an adhesive furnished by the exhibitor. It is believed, however, that the bonding could be improved by the use of one of several adhesives that have shown better affinity to vinyls, or by the addition of a keyed fabric or flocking material to the under surface of the covering. Vinyl covering D was considered satisfactory.

Trowel-On Plastic Metal Compounds—The three trowel-on plastic metal compounds tested may be considered as a group, inasmuch as their properties were quite similar. Plastic metal compound A was rated second lightest of all the materials in weight per sq. yd. (1.55 lb. against desk-top linoleum's 4.44 lb.). Compound B was rated good in water absorption, showing a low figure of 1.3 percent. Impact resistance for all three was about average. Compound A was good in wear resistance (0.005 in.) but the other two were not quite so good as desk-top linoleum, with 0.017- and 0.023-in. wear for Compounds B and C, respectively. None of these materials ignited or burned when tested for flammability. Deep yellow stains, produced from burning cigarettes, were not removable. None of the materials was stained by foods. Notable weaknesses of these materials are excessive blistering in hot (boiling) water and a large water absorption rate when exposed to boiling water. The lack of resistance to 10% sodium hydroxide is also a weakness, as the materials were severely attacked and badly disintegrated. These compounds were not considered satisfactory.

Neoprene Elastomers—The two neoprene elastomers were tested with and without a fabric backing, in thicknesses of $\frac{1}{32}$ and $\frac{1}{16}$ inches. While the materials exhibited no outstanding properties, their resistance to abrasion was as good as the vinyl materials tested, and their flammability characteristics compared favorably with the vinyl materials. Slight stains were produced by burning cigarettes. The angle of slide was 18° for the $\frac{1}{32}$-in. thick neoprene and 14° for the $\frac{1}{16}$ in.-thick neoprene against 30° for linoleum. Their resistance to impact rated evenly with the vinyls and was somewhat better in this respect than the other materials tested, with the exception of battleship linoleum and one of the thicker vinyls. Their resistance to alkali and boiling water was satisfactory, and, although the water absorption was very high, there appeared to be no deterioration. These materials may be given favorable consideration for mess table and bench covering, but showed no appreciable advantage over the linoleums.

One vinyl, of all the materials tested, (vinyl coating A) was given

5—Wear resistance is checked by running specimen on Wearometer



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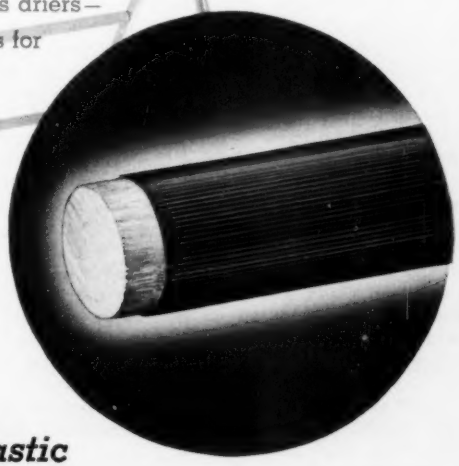

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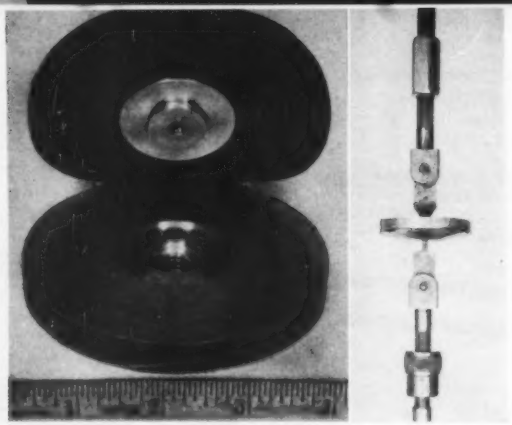

6—(left): Table-top material and 4-in. aluminum disks prepared for bonding strength determining. 7—(at right): test assembly being pulled to rupture at rate of 1 in. per minute

a service test. The service test ran concurrently with the laboratory test, thus enabling a correlation of the results of laboratory and service tests. Two tables covered with this material in a thickness of 0.025 in. have been in actual service aboard an aircraft carrier for over one year. The covering has been reported to be performing satisfactorily and to be generally equal to linoleum.

Methods of Test

The test methods employed in the investigation and described below, apply only to the flexible coverings. The test methods used in evaluating the one paper-base phenolic laminate and which were peculiar to this type of table-top material, have not been described in this article, as the laminate was not seriously considered as a mess table-top and bench covering for Naval use by the Bureau of Ships.

Weight per Sq. Yd. (5)—Four rectangular specimens, nominally 6 by 6 in., were cut and measured to the nearest 0.01 in. and weighed to the nearest 0.1 gram.

Specific Gravity by Displacement of Water (1)—Specimens approximately 2 by 1 in. were prepared by removing the backing material on those materials where it was present, and sanding the rough surface to a smooth finish. The specimens were then weighed in air on an analytical balance to the nearest milligram. By means of a specific gravity bridge the corresponding weight in distilled water at 25° ± 1° C. of each specimen was obtained. To facilitate the wetting of the surfaces of the specimen, a small amount of aerosol, a commercially obtainable wetting agent, was added to the distilled water.

Thickness (5)—The four specimens prepared for weight per sq. yd. were used for obtaining thickness. The thickness was determined at 16 equally distributed points on the specimen by means of a dial thickness gage and a template. The dial thickness gage had a flat pressure foot 0.25 in. in diameter. The other flat bearing surface (anvil) was 2 in. in diameter. The foot exerted a pressure of 20 ±5 p.s.i. in the measuring range. The average of the 16 readings was taken as the thickness of the specimen; the final thickness was the average of the four specimens. In all cases the pressure foot was applied against the table-top surface of the specimens. Precautions were taken to see that the specimens were flat against the anvil of the dial thickness gage.

Resistance to Impact (8)—Specimens 6 in. square were cemented to like pieces of 1/16-in. aluminum sheet[3] with an adhesive. Each specimen was tested separately after being firmly held on a solid horizontal steel plate. A 2-lb. steel ball, after being centered over the specimen, was dropped from a height of 8 feet. Each specimen was subjected to two impacts of the ball at the center of the specimen. The apparatus used is shown in Fig. 1.

Indentation (5)—Ten disks, 2 in. in diameter, were prepared, and the thickness of each disk was measured to the nearest 0.001 inch.[4] The disks were supported by a smooth steel plate, and a pressure of 4800 p.s.i. was applied to the upper (wearing) surface of the specimen for a period of 30 sec. by means of a flat-ended cylindrical steel bar 0.178 in. in diameter (120 lb. weight on this bar gave the specified pressure of 4800 p.s.i.). The pressure was applied at the same point at which the thickness was measured. The bar was supported in a frame in such a manner as to insure the face of its foot being parallel to the surface of the steel plate. The edge of the face of the bar in contact with the specimen was buffed smooth but not rounded. The load was lowered gently until the bar was in full contact with the specimen but not compressed; then the full load was applied in 1 or 2 seconds. In no case, however, was the load dropped on the specimen. After 30 sec. the load was quickly and completely removed. Sixty min. after removal of the load, the residual indentation[5] was measured to the nearest 0.001 in. and calculated as a percentage of the original thickness.[6] The dial thickness gage used in this test had a flat pressure foot 0.125 in. in diameter. The foot exerted a pressure of 20 ±5 p.s.i. in the measuring range. The same gage and pressure were used to measure the thickness of the specimen before and after applying the pressure. Care was taken that the specimen lay flat on the steel plate during the application of the pressure and in determining the thickness of the specimen for this test. The final percent residual indentation was taken as the average of the 10 disks.

Indentation under a pressure of 6000 p.s.i. was determined on ten 2-in. diameter disks as described above, except that a load of 150 lb. was applied to the 0.178-in. diameter steel bar. The apparatus used is shown in Fig. 2.

Shatterproofness—Three specimens, 2⅝ in. in diameter, were prepared by cementing them to 1/16-in. sheet aluminum of the same diameter. The bonded specimen was then mounted securely in an ap-

[3]The 1/16-in. aluminum sheet used was obtained in accordance with paragraph 6 of reference (8).

[4]To obtain significant data, the thinner vinyls were measured to an accuracy of 0.0001 in. while the thicker linoleums were measured to the nearest 0.001 inch.

[5]Residual indentation is defined as the depth of penetration measured 60 min. after removal of load.

[6]The original thickness is to be considered when comparing the percent residual indentation of different materials. Obviously, a thick material having the same percent residual indentation as a thin material would be considerably more damaged and possibly beyond repair, while the latter might be only slightly damaged and still serviceable.

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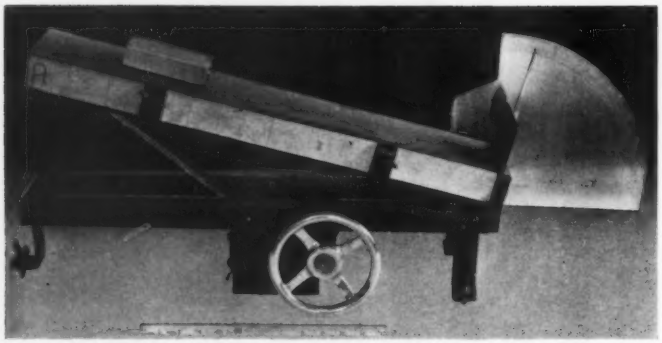

8—In angle of slide test, table-top material is placed on Material Laboratory Friction Machine and leveled by leveling screws set in vertical supports

propriate gage case. The gage case was clamped horizontally to a steel bedplate and the specimen was subjected to successive blows, at its geometric center, by an 8 ±¼-oz. steel ball. The ball was dropped from heights starting at 3 in. above the specimen, and increased by 3-in. steps for each successive blow, until the specimen failed or when a height of 9 ft. was reached. The apparatus used is shown in Fig. 3.

Taber Abrasion (5) (10)—Three 4-in. disks of the material under test were prepared and each disk was weighed to the nearest milligram on an analytical balance. The disks were then subjected in turn to 5000 rev. of wear, using CS17F Calibrase resilient-type Taber Abrasion Wheels in a Taber Abraser (Fig. 4). After each 1000 rev. of wear, or when in some instances the faces of the abrading wheels became clogged or glazed, the wheels were refaced by running them for 25 to 50 rev. on the fine grain side of the ST-11 Duplex Refacing Stone. These revolutions were deducted from the counter reading on the Abraser. At the conclusion of 5000 rev., the specimens were reweighed and the loss in weight determined from the difference between the initial and final weighings. The total wear was reported as the average loss in volume of the three specimens, calculated by dividing the specific gravity of each specimen into its corresponding loss in weight as determined above. The specific gravity was determined on 2- by 1-in. sections cut from the abrasion specimens. The backings were removed, prior to determining specific gravity, from those materials with backings.

Wear Resistance (8)—Specimens, 3 by 2 in., were prepared so that an area of approximately 6 sq. in. was presented to the abrasive in the Wearometer. The abrasive grit used was No. 80 aluminum oxide. Each specimen was secured with an adhesive to a specimen plate, and the thickness was measured at 12 equally distributed points on the specimen by means of a dial thickness gage and a template. The specimen was then subjected to 1500 rev. of the Wearometer, and the thickness obtained at the previously measured points. The differences in thickness were averaged to determine the thickness of the material worn away by the abrasive. The apparatus used is shown in Fig. 5.

Bonding Strength (7)—Fifteen test assemblies were prepared of the table top material bonded[7] to 4-in. diameter aluminum disks[8] as shown in Fig. 6, and allowed to dry at a temperature of 24° ± 2° C. and a relative humidity of 60% ± 5 percent. Five of the test assemblies were allowed to dry for 24 hr. and five for 48 hr., inverted, under a dead weight of 2 pounds. At the expiration of the above drying periods, the weight was removed and the adhesion was determined immediately. The remaining five test assemblies, after an initial drying period of 48 hr. under a 2-lb. weight, were immersed in a water bath at a temperature of 49° ± 2° C., the weight being removed just prior to immersion. Immediately at the conclusion of the immersion period, the adhesive strength was determined. The test assembly was pulled to rupture at the rate of 1 in./min. as shown in Fig. 7, and the maximum load to rupture in pounds was recorded. The adhesion reported was the average of the five readings.

Water Absorption (1)—Six specimens, 4 in. long by 2 in. wide, were prepared. The backing material of three of the six specimens was removed and the rough surface smoothed by finishing with fine sandpaper. The specimens were then subjected to a temperature of 105° ± 2° C. for 1 hour. After conditioning, the specimens were cooled in a desiccator and weighed on an analytical balance to the nearest milligram. Length and width dimensions were measured to the nearest 0.01 in., and thickness to the nearest 0.001 inch. The specimens were then completely immersed in distilled water at a temperature of 25° ± 2° C. At the end of 24 hr. of immersion, the specimens were removed individually, the surface moisture quickly absorbed by a dry cloth, and the specimen reweighed and remeasured. The percent water absorption and percent dimensional change were reported as the average value for the set of specimens with backing and without backing.[9]

Hot Water Test—Specimens of the same size and number were prepared and conditioned as described in the water absorption test. At the end of the conditioning period, after the specimens had cooled to room temperature in a desiccator, the specimens were weighed individually, dimensional measurements taken, and the specimens were then immersed in boiling distilled water for 4 hours. At the conclusion of the immersion period the specimens were removed, the surface moisture quickly absorbed, and the specimens allowed to cool to room temperature in a chamber, where the internal atmosphere was saturated with water vapor before reweighing. After weighing, the dimensions of

(*Continued on page* 172)

[7]The materials were bonded with adhesive furnished by the exhibitor, or for those materials for which no adhesive was furnished, with suitable adhesives on hand at the Material Laboratory.

[8]Aluminum disks were machined from aluminum plate conforming to reference (6).

[9]Results for water absorption from material to material cannot be compared readily as the surface-weight ratio varies.

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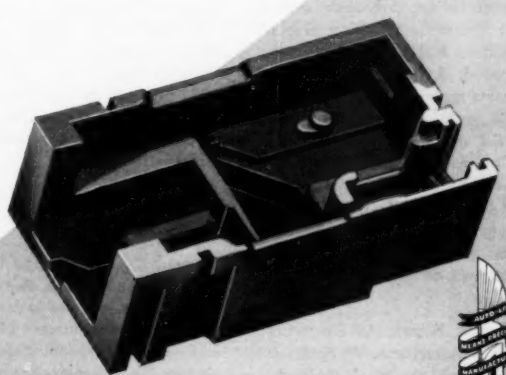

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General

PLASTICS RESEARCH AND TECHNOLOGY AT THE NATIONAL BUREAU OF STANDARDS. G. M. Kline. National Bureau of Standards Circular 494, 14 pp. (June 15, 1950). The activities of the National Bureau of Standards relating to plastics are summarized. A brief outline of the work carried on in each of eight different fields of investigation and 160 references to publications by members of the staff of this Bureau are given.

NEW SOIL STABILIZATION METHOD DEVELOPED WITH CALCIUM ACRYLATE. Roads and Streets *93*, No. 4, 51 (1950). Soils containing water up to 30% by weight can be stabilized by adding calcium acrylate and polymerizing with sodium thiosulfate and ammonium persulfate.

Materials

PREPARATION AND FRACTIONATION OF POLY-4-VINYLPYRIDENE. E. B. Fitzgerald and R. M. Fuoss. Ind. Eng. Chem. *42*, 1603-6 (Aug. 1950). Bulk, bead, and emulsion polymerizations of 4-vinyl-pyridine are described. By proper choice of temperature, emulsifier concentration, modifier concentration, and especially catalyst concentration, polymers having intrinsic viscosities in ethyl alcohol ranging from 0.25 to nearly 10 may be prepared. A typical bead recipe is 100 parts monomer, 200 parts water, 0.25 parts Nekal AEMA, and 0.1 to 2.5 parts benzoyl peroxide, depending on molecular weight desired. Conversion is essentially complete in 4 hr. at 50° C. Fractionation can be carried out by partial precipitation with benzene from dilute nitromethane or *tert*-butyl alcohol solution.

OXAGLYCOL ESTERS AS POLYVINYL CHLORIDE PLASTICIZERS. W. S. Emerson, R. I. Longley, Jr., J. R. Darby, and E. E. Cowell. Ind. Eng. Chem. *42*, 1431-3 (July 1950). Twenty-seven esters of diethylene glycol, triethylene glycol, and similar oxaglycols were prepared and tested as plasticizers for polyvinyl chloride. Aliphatic and mixed aliphatic-aromatic esters showed good compatibility and low volatility and imparted excellent low-temperature flexibility. The purely aromatic esters were generally compatible and less volatile but exhibited poorer low-temperature flexibility. All the compositions ranged from fair to excellent in heat stability.

PHENOLIC MOLDINGS WITH NYLON FILLER. E. E. Halls. Plastics (London) *15*, 194-6 (July 1950). Phenolic plastics filled with chopped nylon yarn are easily molded and have good electrical insulation resistance when wet, low water absorption, low specific gravity, and good dimensional stability at 110° C. when immersed in water and when exposed to cycles of high and low relative humidity and heat. They are superior to woodflour and mineral-filled phenolic plastics in these properties.

Testing

TESTING OF SANDWICH CONSTRUCTIONS AT THE FOREST PRODUCTS LABORATORY. E. W. Kuenzi. A.S.T.M. Bull. No. 164, 21-8 (Feb. 1950). The methods used at the Forest Products Laboratory to determine the strength and permanence properties of sandwich construction are described fully.

THERMAL CONDUCTIVITY OF HOMOGENEOUS MATERIALS. K. O. Beatty, Jr., A. A. Armstrong, Jr., and E. M. Schoenborn. Ind. Eng. Chem. *42*, 1527-32 (Aug. 1950). A new, rapid, and rigorous method is described for direct determination of thermal conductivity of materials such as plastics from data taken under unsteady-state conditions. The method is based on mathematical solution of a boundary-value problem, and the outline of the solution is included. Results are given of application of the procedure to several plastic laminates. A copper block equipped with a thermocouple is sandwiched between two layers of the sample and the resulting sandwich placed between platen surfaces heated to and held at some known constant temperature. The temperature of the copper is then taken at a series of time intervals. The slope of the straight line obtained by plotting these data on semi-logarithmic paper permits calculation of the thermal conductivity by a simple formula. No assumptions are involved in analysis of the data other than constancy of thermal properties over the small temperature change while measurements are being made. The method may be combined with measurements of the thermal diffusivity to calculate heat capacity. The speed of the procedure is such that all three thermal properties, conductivity, diffusivity, and heat capacity, can be determined in less than 1 hr. for a 0.5-in. thick plastic specimen.

Properties

STRENGTH OF HEAT-RESISTANT LAMINATED PLASTICS UP TO 300° C. B. M. Axilrod and M. A. Sherman. J. Research National Bureau Standards *45*, 65-84 (July 1950). The flexural properties of samples of glass-fabric laminates were determined for several conditions of heating and testing. The laminates tested were bonded with various resins, including polyester, acrylic, silicone, phenolic, and melamine types. Flexural tests were made under the following conditions: (1) at 25° C. and 50% relative humidity after 200 hr. of heating at a temperature T; (2) at a temperature T after 0.5 hr. at the temperature T; (3) at a temperature T after 200 hr. at the temperature T; and (4) at 25° C. and 50% relative humidity without heating prior to testing. The temperature T was 150°, 200°, and 250° C. for condition 1: 150°, 200°, 250°, 300°, and 375° C. for condition 2; and 150°, 200°, 250°, and 325° C. for condition 3. The one sample of silicone resin laminate tested was superior to the other laminates in retention of flexural properties at temperatures of 250°

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C. or higher. The single phenolic laminate tested showed good retention of flexural properties when tested at elevated temperatures after 0.5 hr. of heating. After prolonged heating the behavior of the phenolic sample was much less satisfactory, the strength being almost negligible at 250° C. The sample of melamine laminate was superior to the phenolic in retention of flexural strength after prolonged heating at 200° and 250° C. The polyester laminates lost at least 80% of their flexural strength when tested at 250° C.

AN INVESTIGATION OF THE MECHANICAL PROPERTIES OF MATERIALS AT VERY HIGH RATES OF LOADING. H. Kolsky. Proc. Phys. Soc. (London) *62B*, 676-700 (1949). A method is described for determining the compressive stress-strain relation of rubber, plastics, and metals when high stresses are applied in 20 micro-seconds. Results are reported for methyl methacrylate and polyethylene plastics, rubbers, and metals. Marked relaxation phenomena occur in plastics and rubber, and their mechanical properties at high rates of loading are very different from those observed under low rates of loading.

A METHOD OF MEASURING SOME DYNAMIC ELASTIC CONSTANTS AND ITS APPLICATION TO THE STUDY OF HIGH POLYMERS. K. W. Hillier, Proc. Phys. Soc. (London) *62B*, 701-13 (1949). A method is described for determining the velocity of propagation and attenuation of longitudinal sound oscillation in filaments of high polymers from 0° to 50° C. and 0.5 to 30 kc./second. Results obtained with polyethylene are reported.

PERMEABILITY OF CELLOPHANE TO LIQUIDS. S. Madras, R. L. McIntosh, and S. G. Mason. Can. J. Research *27B*, 764-79 (1949). The permeability of cellophane to various organic liquids is reported.

Applications

APPLICATION OF SYNTHETIC RESINS IN THE PAPER INDUSTRY. G. Van Nederveen. Ingenieur *62*, Mk 1-7 (1950); Chem. Abstracts *44*, 5589-60 (June 25, 1950). Polyetheneimine resins are weakly absorbed by cellulose fibers, urea-formaldehyde resins are only partially absorbed, whereas melamine-formaldehyde resins are strongly absorbed and cannot be removed. The melamine-formaldehyde resins are on the fibers and not in them. These resins improve both the dry and wet strengths of paper, the more strongly absorbed resins giving the greatest increases.

GLASS FIBER LAMINATES IN CARTOGRAPHY. E. W. Jackson. Brit. Plastics *22*, 272-80 (June 1950). The production, properties, and applications of sheets of glass fabric laminates made with thermosetting transparent resins for use in map and chart making are described. Laboratory directions for making this sheet material are given. The product has the temperature and humidity stability required and the requisite flexibility.

WORKING SURFACES FOR RADIOCHEMICAL LABORATORIES: PAINTS, PLASTICS, AND FLOOR MATERIALS. P. C. Tompkins, O. M. Bizzell, and C. D. Watson. Ind. Eng. Chem. *42*, 1475-81 (Aug. 1950). The susceptibility of various paints, plastics, and floor materials to contamination with radioactive compounds and their subsequent ease of decontamination were determined by simple empirical tests. The degree of decontamination possible for P^{32}, Ba^{140}, and I^{131}, spilled on 75 surfaces, is reduced to numerical terms, and the efficacy of approximately 20 commercial detergents in decontaminating Lucite and various selected resins is tabulated. Additional information on the probable usefulness of these materials in radiochemical laboratories and attendant facilities is indicated by chemical corrosion tests with common laboratory reagents. It is concluded that some of these materials may be used to advantage in place of glass, stainless steel, or lead for many common functions, and that they may be decontaminated by mild reagents, such as detergents. The combination of the contaminating conditions, the surface material, and the decontamination reagent leads to a high degree of specificity in cleaning efficiency.

Coatings

ANTIFOULING PAINTS. A. L. Alexander, R. L. Benemelis, and S. B. Crecelius. Ind. Eng. Chem. *42*, 1562-7 (Aug. 1950). As a result of the huge quantities of rosin consumed in the wartime production of antifouling paints, studies were made with a view toward determining the role of rosin substitutes for use in soluble-matrix antifouling paint. The advent of tall oil in commercial quantities made it an interesting prospect for this study. In addition tall oil esters of glycerol and pentaerythritol were prepared and studied along with abietic acid and hydrogenated methyl abietate as rosin diluents. The esters appear to affect antifouling efficiency and physical durability adversely in direct ratio to the extent to which they are substituted. Abietic acid and hydrogenated methyl abietate improve perceptibly the physical qualities of the film. Tall oil may be substituted for rosin up to 50% without affecting the performance of the paint.

STUDY OF SOME METHODS OF MEASURING ADHESION OF PAINT FILMS. C. J. Marsel. New York Univ. Coll. Eng., Symposium on Varnish and Paint Chem. *1948*, 61-70. Factors affecting and methods for measuring adhesion of dried coating films are reviewed.

ALLYL STARCH. A NEW CHEMURGIC RESIN. J. R. Roach and R. Nordgren. Org. Finishing *11*, No. 4, 8-13, 15 (1950). The properties of allyl starch and the formation of films from this resin are described. Formulations and properties of the films are reported. They have excellent resistance in the presence of organic solvents.

Molding and Fabricating

GAS-WELDING OF PLASTICS. J. A. Neumann. Electrical Manuf. *46*, 117-19 (July 1950). An improved technique for the gas-welding of plastics is described. This is used to fabricate articles from standard sheets, rods, and tubes.

PIN-POINT OR RESTRICTED GATING. D. G. Kavanagh. Brit. Plastics *22*, 294-6 (June 1950). The principal advantages of restricted gating in injection molding are discussed briefly.

MOLDING OF POLYTHENE. K. J. Persak. India Rubber World *121*, 315-16 (1949). The molding of polyethylene, with special attention to shrinkage is reviewed.

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U. S. PLASTICS PATENTS

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MOLDING. F. J. Dofsen and E. L. Danielson. U. S. 2,510,091, June 6. Method of severing sprues from a molded part and simultaneously molding a second plastic to the part.

COATING. W. Horback (to Celanese). U. S. 2,510,177, June 6. A hot-melt coating of cellulose propionate plasticized with butoxyethyl stearate and dibutyl sebacate.

CARBOXYMETHYL CELLULOSE. W. F. Waldeck (to Wyandotte Chemicals). U. S. 2,510,355, June 6. Subjecting to mechanical mixing in the presence of caustic alkali and an etherifying agent a mass of comminuted cellulose.

THERMOPLASTICS. J. W. Dalgleish (to Pye Ltd.). U. S. 2,510,383, June 6. Placing thermoplastic material between electrodes, applying high frequency energy to heat the material, moving the electrodes toward each other, and thereby cutting the plastic.

POLYMERIZATION. G. W. Smith (to Goodrich). U. S. 2,510,426, June 6. Preparing aqueous emulsion of vinyl chloride, an alkyl acrylate, catalyst, and a silver salt and reacting in the absence of gaseous oxygen.

RESINS. F. J. Carlin, Jr. (to American Cyanamid). U. S. 2,510,496, June 6. Heating under alkaline conditions an alkyl ether of dimethylol urea with furfuryl alcohol.

POLYMERS. E. L. Kropa (to American Cyanamid). U. S. 2,510,503, June 6. Polymers and copolymers of unsaturated triazines.

BOWLING PIN. S. L. Leonard, Sr. U. S. 2,510,505, June 6. A reinforced plastic bowling pin.

POLYTHIOESTERS. P. J. Flory (to Wingfoot). U. S. 2,510,567, June 6. A polythioester prepared by the condensation of a dibasic acid chloride and a dimercaptan.

POLYMERS. H. A. Pace (to Wingfoot). U. S. 2,510,600, June 6. Polymers of ether carbonates.

SUITCASE SECTIONS. A. L. Long. U. S. 2,510,643, June 6. A suit case comprising companion side sections of plastic material.

ACENAPHTHYLENE POLYMERS. H. F. Miller and R. G. Flowers (to G. E.). U. S. 2,510,647, June 6. Passing boron trifluoride through a solution of acenaphthylene at low temperature and adding a non-solvent to obtain a higher molecular weight.

INLAY TRANSFER. O. K. Marquardt. U. S. 2,510,750, June 6. Inlay transfer method of printing thermoplastic films.

MOLDING COMPOSITION. J. K. Simons (to Libbey-Owens-Ford). U. S. 2,510,762, June 6. A dry thermosetting composition of urea-formaldehyde containing ethylene glycol bis(benzenesulfonate) as a curing catalyst.

VINYL FLUORIDE. F. L. Johnston and D. C. Pease (to Du Pont). U. S. 2,510,783, June 6. Subjecting a mixture of vinyl fluoride, a polymerization medium, and an azo catalyst to polymerizing conditions.

RESINS. C. C. Schrimpe (to Hercules). U. S. 2,510,837, June 6. Alkali-resistant resin prepared by reacting a phenol-formaldehyde with a monohydric alcohol ester of rosin.

MOLDING. C. H. Stowe. U. S. 2,510,841, June 6. Apparatus for molding thermosetting plastics.

LACQUER. K. D. Bacon and A. E. Young (to Dow). U. S. 2,510,851, June 6. Ethyl cellulose, phenol-modified coumarone-indene lacquer for polystyrene.

COPOLYMERS. S. T. Putnam (to Hercules). U. S. 2,510,902, June 6. Copolymer of a maleic anhydride and a derivative of a monodecene.

ADHESIVE. F. J. Schubert and T. O. Anderson (to Dow). U. S. 2,510,908, June 6. Adhesive for polystyrene consisting of a polyvinylaromatic resin and a triarylphosphate dissolved in a chloro-aliphatic hydrocarbon.

THERMOSETTING RESIN. J. K. Simons (to Libbey-Owens-Ford). U. S. 2,510,935, June 6. A resinous reaction product of formaldehyde with 2,5-diamino-1,3,4-thiodiazole.

CELLULOSE DERIVATIVES. J. P. Hollihan, Jr. and S. A. Moss, Jr. (to American Viscose). U. S. 2,511,060, June 13. Mixing acrylonitrile with viscose to react therewith to produce cyanoethyl cellulose xanthate and hydrolyzing to produce carboxyethyl cellulose.

CONDENSATES. J. R. Ingram (to Monsanto). U. S. 2,511,063, June 13. Condensates of formaldehyde, phenol, and a condensate of acetone and a primary aromatic amine.

ELASTOMERS. J. R. Ingram (to Monsanto). U. S. 2,511,064, June 13. Butadiene-styrene copolymer having incorporated therein the fusible condensate of phenol, formaldehyde, 2,2,4-trimethyl-dihydroquinoline.

MOLDING. W. F. Robb (to Shaw Insulator). U. S. 2,511,079, June 13. Mold assembly for molding a plurality of articles having undercuts.

EXTRUSION. G. E. Gliss (to Western Electric). U. S. 2,511,203, June 13. Apparatus for simultaneously advancing and working plastic material to be extruded.

COPOLYMERS. J. Harmon (to Du Pont). U. S. 2,511,258, June 13. A copolymer of hexafluorocyclobutene and a polymerizable ethylenic compound.

COPOLYMERS. J. B. Rust (to Montclair Research and Ellis-Foster). U. S. 2,511,296, June 13. Copolymers of silicon derivatives.

SILANES. J. B. Rust and C. A. MacKenzie (to Montclair Research and Ellis-Foster). U. S. 2,511,297, June 13. Blowing dry air through an alkoxy silane until a soluble polymer is formed.

POLYMERS. R. W. Upson (to Du Pont). U. S. 2,511,310, June 13. Polymers from hydrocarbon silane diols and polyisocyanates.

MOLD BASE. W. Kosobud (to De-

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troit Mold Engineering). U. S. 2,511,-350, June 13. A mold base for a mold for plastic material.

MOLDING. O. Firing (to Talon). U. S. 2,511,402, June 13. Machine for injection molding fastener elements directly onto a flexible mounting member.

CATALYSTS. M. J. Roedel (to Du Pont). U. S. 2,511,480, June 13. Polymerizing ethylene in the presence of a heteropolyperoxide from acetone and a different ketone.

POLYMERS. H. Rinke, H. Schild, and W. Siefken (to U. S.). U. S. 2,511,544, June 13. Diol-diisocyanate polymerizates.

ENGRAVING. C. L. Stuempges. U. S. 2,511,552, June 6. Engraving designs in bodies of transparent plastic.

VINYL POLYMERS. W. J. Lightfoot (to U. S. Rubber). U. S. 2,511,593, June 13. Mixing vinyl chloride, water, and an alkali metal persulfate; and heating under pressure until granules of polymer settle from suspension.

GRANULAR POLYMERS. M. Baer (to Monsanto) U. S. 2,511,811, June 13. Vinyl halide is dispersed in water containing a dispersing agent comprising a hetero-polymer of vinyl acetate and maleic acid, and an unsaturated carboxylic acid or partial esters of polyhydric alcohols, and the mass is subjected to polymerization conditions.

RESINS. C. E. Rehberg and C. H. Fisher (to U. S.) U. S. 2,511,830, June 20. Resinous polymers of a poly-alkyl substituted cycloalkanol ester of an unsaturated acid.

RESINS. S. O. Greenlee (to Devoe and Raynolds). U. S. 2,511,913, June 20. Adding aldehyde-aromatic amine resins to complex epoxide resins and heating.

EXTRUSION. S. M. Martin (to Western Electric). U. S. 2,511,986, June 20. Apparatus for extrusion of organic plastic material.

POLYMERS. H. C. Gulledge (to Du Pont). U. S. 2,512,058, June 20. A modified organopolysiloxane produced by reacting an ester of titanic acid with the hydrolysate of an organohalosilane.

RESINS. I. Kreidl and W. Kreidl (to Ferro Enamel). U. S. 2,512,-

063, June 20. Reacting zirconium *n*-butylate with trihexyl phosphate to produce a resin.

MOLDING. S. K. Moxness (to Minneapolis-Honeywell). U. S. 2,512,364 June 20. Process of preheating thermosetting resinous material with steam prior to molding.

MOLDING. I. T. Quarnstrom. U. S. 2,512,379, June 20. Ejector box for a mold base.

RESINS. D. E. Adelson and H. F. Gray, Jr. (to Shell). U. S. 2,512,410, June 20. Heating a linear homopolymer of allyl acetate with diethyl phthalate and sodium ethylate and distilling the ethyl acetate by-product.

FOUNDRY COMPOSITION. L. Rouzet (to L'Impregnation). U. S. 2,512,441, June 20. A body of sand and a binder of amylaceous urea-phenol-formaldehyde resin.

CELLULAR PLASTICS. R. E. Maier (to Du Pont). U. S. 2,512,463, June 20. Composite of a cellulose derivative, a granular powder, and a volatile liquid, said composite capable of expansion to a cellular mass.

POLYMERIZATION. J. O. White (to Du Pont). U. S. 2,512,472, June 20. Subjecting a liquid vinyl ester to polymerization and adding, as polymerization terminator, a styrene.

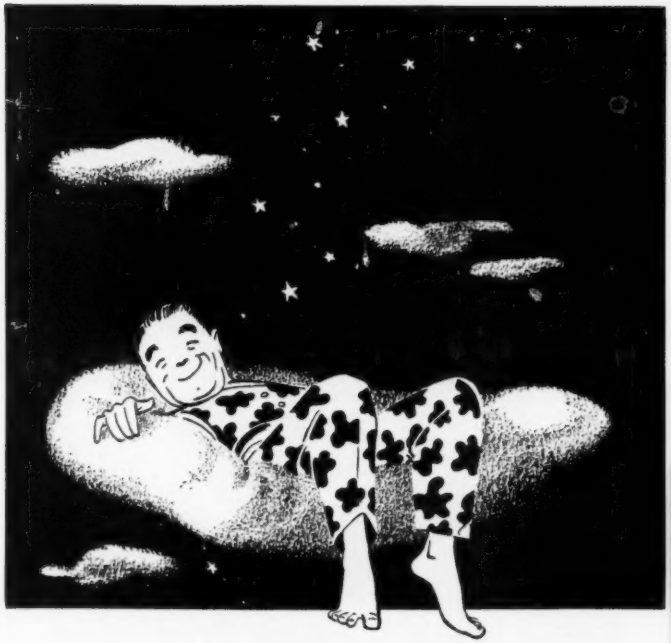
MOLDING. A. J. Wiltshire, R. W. Lotz, and R. B. White (to Apex Electrical Mfg.). U. S. 2,512,535, June 20. Apparatus for molding resinous articles.

POLYMERS. H. Bates, J. W. Fisher, and E. W. Wheatley (to Celanese). U. S. 2,512,599, June 27. Polymer of linear poly-1,2,4-triazole.

POLYMERS. H. Bates, J. W. Fisher, and E. W. Wheatley (to Celanese). U. S. 2,512,600-1, June 27. Heating sebacic diamide, sebacic dihydrazide, and hydrazine until fiber-forming properties are obtained.

POLYAMIDES. E. K. Bolton and W. Kirk, Jr. (to Du Pont). U. S. 2,512,606, June 27. A fusible, clear polyamide prepared by reacting a dicarboxylic acid and a stereoisomeric mixture of di(p-aminocyclohexyl) metane.

TRIAZOLE POLYMERS. J. W. Fisher,



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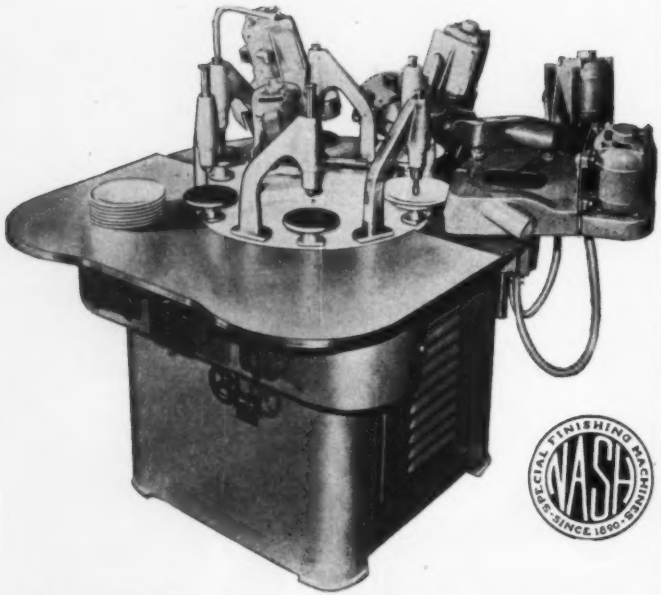

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H. Bates, E. W. Wheatley, and G. W. I. Shearyn (to Celanese). U. S. 2,512,624-30, June 27. Preparation of 4-amino-1,2,4-triazole polymers.

HYDRAZINE POLYMERS. J. W. Fisher and E. W. Wheatley (to Celanese). U. S. 2,512,631-1-2-3, June 27. Heating a polymer obtained by reacting hydrazine and a dicarboxylic acid with an inorganic base such as hydrazine or ammonia.

CONDENSATES. J. W. Fisher, E. W. Wheatley, and H. Bates (to Celanese). U. S. 2,512,634, June 27. Condensation of linear 1,2,4-triazole with aldehyde, diisocyanate, or diurethane.

POLYMERS. R. W. Moncrieff (to Celanese). U. S. 2,512,667, June 27. Heating a dihydrazide of a dicarboxylic acid with sufficient hydrazine to produce an acid-resistant polymer.

UREA CONDENSATES. G. K. Vogelsang and E. E. Novotny (to Borden). U. S. 2,512,671-2, June 27. Reacting urea and formaldehyde to the soluble resin stage in the presence of acid, neutralizing, concentrating, and then adding more formaldehyde.

POLYMERIZATION. R. B. Thompson and H. S. Bloch (to Universal Oil Products). U. S. 2,512,698, June 27. Polymerizing aromatic polyfulvenes.

POLYMER. H. C. Beachell (to Du Pont). U. S. 2,512,709, June 27. Mixing chloral and a 1,3-dihydric phenol in an inert solvent and refluxing.

OIL-WELL SEALER. R. P. Courtney (to Union Carbide). U. S. 2,512,716, June 27. A composition of water, Portland cement, a base-catalyzed phenol-formaldehyde resin, and another aldehyde.

RESIN. G. I. Keim (to Hercules). U. S. 2,512,720, June 27. A dry sulfanilic-acid-modified urea-formaldehyde resin.

POLYESTERS. W. M. Lanham (to Union Carbide). U. S. 2,512,722-3, June 27. Polyesters of 2-ethylhexanediol-1,3 with saturated dicarboxylic acids and copolymers thereof with copolymers of vinyl chloride and vinyl acetate.

COPOLYMERS. G. R. Penn, Jr. and J. F. Suter (to Union Carbide and Carbon Corp.) U. S. 2,512,726, June 27. Copolymer of vinyl chloride, vinyl acetate, and vinyl alcohol.

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NEW MACHINERY AND EQUIPMENT

RADIANT GLASS PANELS—Heating units of a new type, the Pyrex Brand E-C Radiant Glass Panels manufactured by Corning Glass Works, Corning, N. Y., are now available through Sill Industries, New York, N. Y., for processing plastics in many forms.

The new heater is designed for drying, curing, or baking operations, primarily on flat surfaces, but largely wherever completely uniform surface heat at high temperature is required for processing.

Essentially these panels consist of Pyrex brand heat-resisting glass plates with a fired-on electrical conducting coating on one side. Averaging 0.000016 in. thick, the film is practically integral with the glass.

The temperature may be set and held at any point up to 660° F. The panels are available in two sizes—12 by 12 in. and 16 by 24 in.—which are used in multiples for oven and conveyor operations. Panels are so compact that only 3 in. between reflector and work is required.

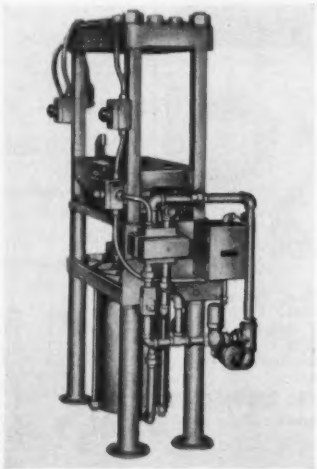
In the plastics industry, these radiant glass panels are suitable for drying and curing synthetic coatings, as pre-heaters for molding and forming sheet plastics, and for vacuum forming, to name some uses.

Sill Industries reports that the E-C Radiant Glass Panels are engineered for specific applications either by themselves or, depending upon the type of operation, in combination with the Fibre Glas Super-Heater. The latter is manufactured by Industrial Radiant Heat Corp. and is also distributed by Sill.

Both the Super-Heater and the E-C Radiant Glass Panel develop radiant heat in a wave length that gives great heat penetration, resulting in very fast operating speeds at costs often equal to other mediums.

HYDRAULIC PLATEN PRESS—Introduction of a fully automatic 10-opening hydraulic platen press for precision polishing and laminating of plastics sheets has been announced by R. D. Wood Co., Room 1072, Public Ledger Bldg., Philadelphia 5, Pa. The complete sheet-production unit includes the press, rated at 880 tons; a 20-opening elevator for loading and unloading with a minimum of idle press time; a two-pressure pumping unit for press and elevator operations; and a fully-automatic valve control system. This covers adjustable control of the press-operating cycle along with pressure application and platen temperature regulation.

ALKYD PRESS—A high speed, semi-automatic, air operated, platen type press especially designed for molding alkyd resins has been introduced by Hannifin Corp., 1154 S. Kilbourn Ave., Chicago 24, Ill. Constructed for fast but gentle closing, the equipment is adjustable to 2-sec. speed, and is provided with a special control for slowing down the platen at the instant of closing to permit accurate molding of delicate parts. This closing action is achieved by an exclusive valving system whereby the press can develop 15 tons of output force with 80 p.s.i. air supply. The unit is of the four-column type with the cylinder located below the platen.



IMMERSION THERMOSTAT—Control of both liquid and air temperatures is possible with a new rocket-design, pencil-type immersion thermostat introduced by George Ulanet Co., 417 Market St., Newark, N. J. The rapidly responding thermal element comprises a metal tube and rod of different coefficients of expansion, securely bonded to each other at one end. The opposite end of the rod operates a switch mounted on a sturdy casting. Ulanet's latest addition to its control instrument line is rated at 1500 watts at 115-230 v. A.C., non-inductive load. It can be supplied in various adjustment ranges from —100° F. to 700° F.

WIDE-THROAT GRINDER—A special-purpose grinder has been designed specifically for large thin-section scrap plastic articles by Ball & Jewell, Inc., 26 Franklin St., Brooklyn 22, N. Y. The unit, which has a throat opening 8 by 8 in., is particularly adaptable to gates and sprues that are difficult to feed through a small-throat machine. As an example of its versatility, a 10-in. phonograph record may be fed in without pre-cutting. The grinder is equipped with a 1½-hp. motor, and has a capacity of 150 lb. per hour.

DIE GRINDER—Designed specifically for facing new die blocks, reconditioning dulled impression edges, and preparing worn dies for resinking is a new grinder developed by Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn. The unit has been designated the Vertical Die and Surface Grinder, and is available in two sizes with table capacities of 16 by 24 in. and 36 by 42 inches.

Operating as a vertical profiler, the machine readily finishes flats around irregular reliefs, and is said to be particularly suitable for precision step grinding. Surface finishes of 1½ to 2 micro-in. are capable of being produced without need for subsequent lapping or polishing, and with minimum breaking-down of cutting edges. The machine consists of a rigidly constructed bed on which a hydraulically operated

(*Continued on page* 135)

NEW! VAN DORN 2-ounce Injection Press

Utilizing the same rugged construction with doubled capacity, this Van Dorn press now offers you more profitable production with molding time reduced 30% to 50%. The new press has a larger heating cylinder with more plasticizing capacity; greater injection pressure; faster cycling due to larger motor and pump; and a unit for cooling hydraulic oil.

Surprisingly low in price, this versatile press uses inexpensive molds, can be set up by one man in 20 minutes, and operates 8 hours for under 1 dollar!

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Write for Bulletin PC-1, Wheelco Instruments Company 675 West Harrison Street, Chicago, Illinois

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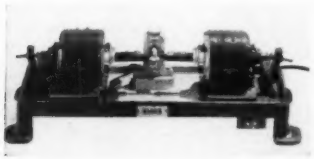
table reciprocates. A cross rail, supported by two uprights, carries a vertical-spindle which can be moved cross-ways by a sensitive control handwheel.

The 16- by 24-in. unit is equipped with three spindle speed changes which adapt the machine to grinding carbide or tough die steels, while the 36- by 42-in. model operates with a spindle speed of 1750 r.p.m.

MULTI-PURPOSE PARTS PRODUCER—Manufacturers of small precision parts will be interested in a new machine for rapid countersinking,



chamfering, and burring developed by Black Drill Co., 1400 E. 222nd St., Cleveland 17, Ohio. Basic components of the unit are a cast-iron base on which are mounted two traversing shaft motors; opposed cutting tools mounted in collets at the ends of the shafts; a tool post with micrometric adjustments; and a tungsten-steel work holder.

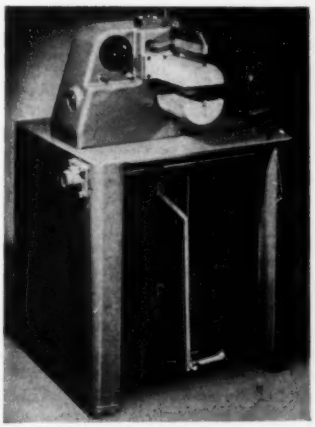
By depressing a foot pedal which actuates both shafts simultaneously, tools are brought to the work point. Each shaft has a micrometric adjustment for close control of cutting depth. Motors from 1/3 to 1 hp. and from 600 to 3600 r.p.m. can be used. Maximum stroke, limited by motor shaft travel, is 2 in., permitting wide variation in the types and sizes of work that can be performed on the machine.

DUPLEX CYCLE TIMERS—Two timers combined in a single unit comprise the Type DU Duplex Cycle Timer made by The R. W. Cramer Co., Centerbrook, Conn. When energized, the device will open or close one or two load or control circuits continuously, or will permit the timer to perform only one complete cycle and then stop. Typical uses include control of a machine's idle and running time; automatically alternating the operation of two motors; controlling the period feeding of chemicals to boilers; and uniformly reversing gas flow in such equipment as open hearth furnaces.

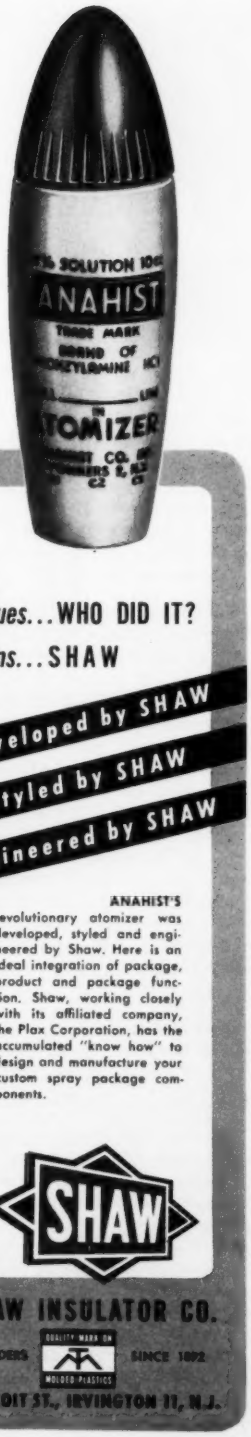
Two styles are available, one for intermittent duty having a clutch built within the motor itself and operated by a magnetic effect on the rotor; and a second for continuous duty having a clutch consisting of two gear members actuated by a small electromagnet. Variable time ranges are provided by 11 dials ranging from 15 sec. with ¼-sec. scale divisions to 5 hr. with 15-min. scale divisions.

PLASTIC CYLINDER FABRICATOR—Aimed primarily at fabricators of sheet plastic for making rigid transparent packages and visual displays is the Taber Model 138 Sheet Plastic Cylinder Fabricator produced by Taber Instrument Corp., 136 Goundry St., N. Tonawanda, N. Y. The plastic cylinders produced are automatically sized to exact diameter before the lap joint is sealed, thus eliminating variations in diameter sometimes encountered when a solid mandrel is used.

A precision adjustment in diameter can be made by a hand knob operating a fine thread screw. A set of five mandrels is available for producing cylinders up to 10 in.



long and from 2½ to 8½ in. in diameter. The Model 138 is operated by a foot treadle mounted on ball bearings. A conveniently located wick-type solvent applicator is also provided. The entire unit is a companion machine to the Model 135 Cylinder Beader which beads the ends of the cylinders.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BOOKS AND BOOKLETS

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"Best's Safety Directory."

Published by Alfred M. Best Co., Inc., 75 Fulton St., New York 7, N. Y. 511 pages. Price $5.00.

Covering the entire field of safety, fire protection and control, hygiene, first-aid, and sanitation, this volume shows what safety products or devices to use for specific hazards, how to use them, and where to get them.

One feature of the directory is its indexing and subject-grouping system which makes it easy to locate safety products even when the user is not certain of the type or name of the product he needs.

"Technique of Organic Chemistry, Volume III." Edited by Arnold Weissberger.

Published by Interscience Publishers Inc., 215 Fourth Ave., New York 3, N. Y. 661 pages. Price $10.00.

The present series is devoted to a comprehensive presentation of the techniques which are used in the organic laboratory and which are available for the investigation of organic compounds. This third volume of the series covers heating and cooling; mixing; centrifuging; extraction and distribution; dialysis and electrodialysis; crystallization and recrystallization; filtration; and solvent removal, evaporation, and drying.

"Physical Chemistry of High Polymeric Systems" by H. Mark and A. V. Tobolsky. Second Edition

Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 306 pages. Price $6.50.

In this completely revised and augmented edition, the principal objective is to present a condensed selection of basic facts regarding the physical chemistry of macromolecules. To this end, most of the space is devoted to a discussion of results which have been presented in the form of tables and figures illustrating specific cases to which the method under consideration was successfully applied. Numerous references to modern comprehensive treatises and to pertinent original contributions are given. The chapters on molecular structure are followed by a treatment of the present concept of intra- and intermolecular forces.

New products for the food industry—The company's new products used as emulsifiers, thickeners, stabilizers, and whipping and anti-staling agents by the food industry are outlined in this eight-page catalog. Descriptions, compositions, and specifications are given for these products which include glyco and glyceryl monostearates, partial esters of edible fatty acids and polyhydric alcohols, and the newly developed "Aqualized" vegetable gums. *Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y.*

The story of cellophane—The history of this material and the impact it has had on the American scene are set forth in pictorial form in this 24-page booklet. Applications and advantages are pictorialized. The techniques for making the material in the plant, as well as a possible, although costly, home-made process, are also presented. The role of consumer, customer, and processor completes the picture of cellophane. *E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.*

The technology of fungi, mold and mildew—A 161-page compilation of technical references has been prepared by the Philadelphia Quartermaster Laboratories, with special emphasis on studies since 1927. This reference book is now available at $4.50 from *Office of Technical Services, Department of Commerce, Washington, D. C.*

Manual of electric instruments—Prepared primarily for use in schools, this new 150-page revised edition describes the fundamentals of construction and operation of all major types of electric instruments. Such instruments as thermocouples, synchroscopes, frequency meters, and electric telemeters are explained; the text is supplemented with a full reference index. Price $1.00, from *General Electric Co., Schenectady 5, N. Y.*

Exportable surpluses; chemical products, March 1950—In view of the need by Western European nations to use their dollar sources wisely and to employ their productive capacity to the maximum, a survey has been prepared of the production possibilities in the European chemical industry which are unemployed at the present time. *Secretariat of the Chemical Products Committee. Organization for European Economic Cooperation, 2 rue Andre Pascal, Paris 16, France.*

Dry coloring method—Dry coloring of Lustrex styrene colorant blend molding compound is described in this 14-page booklet. The new method eliminates the intermediate step of compounding, and the booklet outlines and illustrates the simple equipment necessary for this operation. In addition to a description of the process, the text lists equipment sources, dry coloring formulas, and miscellaneous colorants for Lustrex styrene. Also covered are variables, color dispersion and distribution, molding effects on color, dusting, and cleaning equipment. *Monsanto Chemical Co., Springfield, Mass.*

1001 uses for Sealtuft—Ideas and suggestions for decorators, manufacturers, and designers are contained in this folder presenting the many applications of stitchless quilted vinyl and demonstrating its versatility. The five Sealtuft patterns—diamond, tile, channel, scroll and trellis—are illustrated. *The Jason Corp., 1033 Jefferson St., Hoboken, N. J.*

Tumb-L-Matic processes and compounds—Basic steps for completely finishing metal and plastic parts by wet and dry tumbling processes are described in this two-page bulletin. The effects of each of the three most widely-used Tumb-L-Matic operations—cutting, smoothing, and lustering—are discussed fully. General information on the proper use of various compounds and carriers is also given. Four charts indicate

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which compound-carrier combination should be used for the different operations. *Lupomatic Industries, Inc., 4510 Bullard Ave., New York 70, N. Y.*

Handbook of material handling—An analysis of material-handling operations and the application of the unit-load method with power-operated industrial trucks and accessories is contained in this 72-page guide. Entirely new in text, charts, diagrams, and engineering data, the book is divided into four sections: evaluation of industrial truck handling; material-handling management; organization of an industrial-truck system; and practical truck engineering. Single copies of the book are available at $1.00, but copies requested on company letterhead will be supplied without charge. *The Electric Industrial Truck Association, 3701 N. Broad St., Philadelphia 40, Pa.*

Portrait of Tennessee Eastman Corp.—The growth of this industrial concern is pictorially reviewed in 30 pages beginning with its founding by Eastman Kodak Co. in 1920 as a manufacturing unit for methanol, essential ingredient of photographic film base, and continuing through the early production of cellulose acetate in the late 1920's and the commercial production of acetate yarn in 1931 to the present day. The company's products—acetate fiber, cellulose acetate and cellulose acetate butyrate, industrial chemicals, and acetate dyestuffs—are illustrated in color. The seven divisions of the company are treated photographically with accompanying explanatory text. *Tennessee Eastman Corp., Kingsport, Tenn.*

Pyrex S-C—A new heat source for industrial application is offered by the radiant glass panels described in this eight-page booklet. The panels consist of Pyrex-brand heat-resisting glass plates with a fired-on electrically conducting coating on the surface. Typical applications of the panels which are illustrated include yarn drying, lacquer drying, and petroleum fuel dehydration. Engineering properties are described, along with suggested uses for the coated glass. An insert tabulates standard sizes, ratings, and prices. *Corning Glass Works, Corning, N. Y.*

Principles of color sensitometry—This basic text, a cooperative committee production, deals with the instruments available for use in color research and for quality control in practical use of color processes. Sections of the 72-page booklet cover sensitometric exposures; processing of sensitometric tests; quantitative evaluation of the image; densitometer design principles; transformations between integral and analytical densities; interpretation of sensitometric results; and statistical aspects of color sensitometry. Price $1.00. *Society of Motion Picture and Television Engineers, 342 Madison Ave., New York 17, N. Y.*

Plastics education in science and engineering—A suggested program for plastics education at both the undergraduate and the graduate levels of engineering and science schools is offered in this 16-page booklet. In addition to such basic courses in the undergraduate curriculum as general physics and chemistry, elective courses in engineering plastics and the chemistry and technology of high polymers are recommended. Mechanical engineering, chemical engineering, and chemistry are suggested on the graduate level, along with thesis topics. *The Society of the Plastics Industry, 295 Madison Ave., New York 17, N. Y.*

Koppers products and activities—A history of the company's origins, formation, and expansion, along with its products and activities, is contained in this 20-page brochure. Listed are plants and sales offices of the various divisions—chemical, engineering and construction, gas and coke, metal products, tar products, and wood preserving. A complete summary of the company's products by division is also given. *Koppers Co., Inc., Koppers Building, Pittsburgh 19, Pa.*

Tygon corrosion-resistant paint—Plastic paints designed to protect surfaces exposed to attack by acids, alkalies, oils, waters and alcohols, are described in this 12-page booklet. Exceptional chemical resistance accompanied by freedom from contamination, non-aging characteristics, non-flammability, and waterproofness are among Tygon's major claims. A complete table of chemical resistance characteristics is included along with recommended primers and surface treatments. *U. S. Stoneware Co., P. O. Box 350, Akron 9, Ohio.*

Decalcomania—The commercial uses of product decoration with decalcomanias and their sales value are illustrated by hundreds of designs which are divided into juvenile decoration, floral designs, housewares decals, and novelty patterns. A special section is devoted to Fabri-cals, a new type of hot-iron decalcomania developed to transfer multi-colored, washable designs to fabrics. *The Meyercord Co., Dept. PD, 5323 W. Lake St., Chicago 44, Ill.*

Mixers, Catalog 32F—Mixing equipment capable of accommodating all types of substances is illustrated and described in this 24-page booklet. The company's wide variety of mixers includes the horizontal batch type; sifter and mixer; heavy-duty machines, both belt and motor driven; trowel-type mixers; straight-brush sifters; continuous twin-shaft equipment; tumbling-prism mixers; and vertical liquid mixers. *Mercer-Robinson Co., Inc., 30 Church St., New York 7, N. Y.*

Modern drawing and document reproduction—Describing photographic materials and methods for improving the legibility of reproduced engineering drawings and business documents, this 16-page booklet breaks down these techniques into the reproduction of tracings, blueprints, and opaque drawings on paper, film, and cloth. Specialized recommendations suggest procedures for restoring old drawings and eliminating hand tracing. Additional information relates to business forms, correspondence, and card records. Microfile equipment is briefly described, together with projection materials for making prints from microfilm negatives and for making change-of-scale copies. *Industrial Photographic Div., Eastman Kodak Co., Rochester 4, N. Y.*

Pliolite S-6B—This new rubber reinforcing resin which is said to improve substantially production processing of shoe-sole stocks is described in this bulletin which out-

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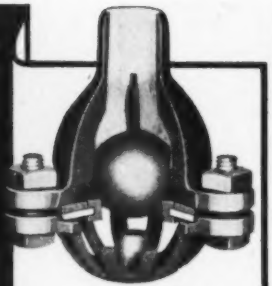

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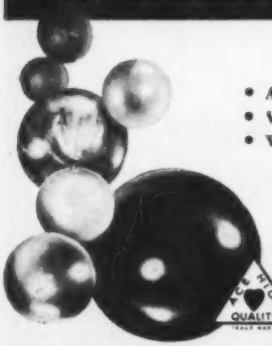

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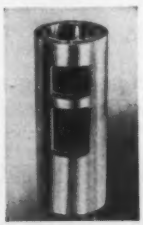

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LOS ANGELES 11, CALIFORNIA
WRITE FOR ENGINEERING AND PRODUCTION DATA BOOK!

lines the material's properties and explains compounding procedures, processing, and applications. Chemically similar to Pliolite S-6, the new resin is claimed to give greater plasticizing action at lower processing temperatures, making possible shorter and more rapid mixing cycles. *Chemical Div., The Goodyear Tire & Rubber Co., Akron, Ohio.*

Planning better products with Hercocel E—Product potentialities from Hercocel E, the company's ethyl cellulose molding powder, are provocatively set forth in a series of color sketches prepared by Sundberg-Ferar, Detroit industrial designer. Pointing out that ethyl cellulose, among the toughest and most durable of all plastics materials, first found widespread use and acceptance during World War II in the proximity fuze, the 12-page booklet suggests many peacetime applications which utilize the material's high-impact strength, dimensional stability, and exceptional resistance to extremes in temperatures. Suggested designs are presented for a variety of products which include mechanics' tools, office furniture, flashlights, housewares, and sporting goods. *Hercules Powder Co., Wilmington, Del.*

Niacet vinyl acetate—Shipping and handling of this chemical, which is chiefly used as the base material for the production of thermoplastic polyvinyl resins, adhesives, and surface coatings, are described in this four-page bulletin which presents physical and chemical properties and latest specifications. Precautions to be followed when removing the stabilizers and when polymerizing vinyl acetate to form polyvinyl acetate, polyvinyl alcohol, polyvinyl acetals, or copolymer resins are outlined. *Niacet Chemicals Div., 993 Niagara Building, Niagara Falls, N. Y.*

Solid fatty acids—Information on specifications, characteristics such as stability, composition, high quality, and uniformity, and their effect on finished products utilizing fatty acids is given in this 10-page bulletin. Other factors such as processing methods and packaging are also covered. *Emery Industries, Inc., Carew Tower, Cincinnati, Ohio.*

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to reduce pressures as high as 6,000 lb. per sq. in. when you are equipped with an

ATLAS Type "E"
High Pressure Reducing Valve

like that shown at the right. And what's more, despite the high pressure there is no shock. It makes no difference whether you are using water, oil, or air—it takes them all with equal ease.

This outstanding valve is now being used in all of the leading plastics plants.

The Outstanding Features Are:

Forged steel body. Internal metal parts are of hard chromium plated stainless steel. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. Ask for complete data.

For other ATLAS plastics plant products see the partial list in our ad in the January 1950 issue of MODERN PLASTICS

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REGULATING VALVES FOR EVERY SERVICE

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Consult a Pioneer Formulator of

ORGANOSOLS AND PLASTISOLS

For Your Particular Requirements

COLOR
TOUGHNESS
FLEXIBILITY
CHEMICAL RESISTANCE
FAST PRODUCTION
AT LOW COST

Specialists of long standing in formulation of vinyl compounds which convert from liquid to solid by simple application of heat. No pressure nor expensive molds required. Excellent for molding hollow objects, dip coating, wire coating. Let us develop special formulations to meet your requirements. Take advantage of our experience in this rapidly expanding field. Inquiries invited.

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Specifically DESIGNED for LABORATORY SERVICE

This compact, 30-ton, self-contained hydraulic platen press is specifically designed for the exacting service of the laboratory. Accurate, versatile and easy to use, it is one of many types manufactured by R. D. Wood for laboratory service.

The press operates under a maximum working pressure of 2,200 psi, has an 8" ram stroke, a 24" press opening and occupies a floor space of approximately 4' x 4'. The press platens, measuring 12" x 18", may be either steam or electrically heated. The press is equipped with an elevator for raising and lowering molds from the bench to press platens.

Write, without obligation, for information on this and other R. D. Wood hydraulic presses for plastics.

HYDRAULIC PRESSES ... GENERAL PURPOSE
ACCUMULATORS ... INTENSIFIERS

Est. 1803 **R. D. Wood Company**

INTERNATIONAL PLASTICS NEWS*

Activities Around the World of Interest and Importance to the Plastics Industry in the United States

England

British Trade—A dramatic swing-over from an adverse to a favorable balance of overseas trade in plastics materials is revealed in the half-yearly trade figures of the United Kingdom. It has been achieved in two years.

U. S. A. ranks as the chief supplier of plastic materials to Britain, accounting for two-thirds of the volume this year, and Canada is second. The main imports and exports by types are shown in the table.

	Imports	*Exports*
	cwt.	*cwt.*
Vinyl resins:	19,260	149,296
Other synthetic resins:	18,176	
Styrene molding powders:	30,982	99,427
Other molding powders:	16,093	
Sheet, rod, tube, film, and foil		
cellulose acetate:	14,316	n.s.[1]
cellulose nitrate:	23,209	6,570
laminated:	n.s.[1]	12,559
acrylic:	n.s.[1]	18,432
all others:	5,676	17,314

[1] n.s. (Not specified)

Imports of vinyl resins were up 20% compared with 1948, styrene molding powders up 300%, and other molding powders down 80%. Exports of synthetic resins were up 100%; molding powders up 30%, acrylics up 50%.

Tariffs—Much pressure is being exerted by the British plastics industry for a removal of anomalies and a reduction of the high U. S. tariff wall against plastics materials. This autumn an I.T.O. conference to be held at Torquay, Devonshire, Eng., will review evidence given by leading United Kingdom plastic men. They complain that such tariffs as those ranging from 30 to 60% ad valorem on such materials as polyvinyl chloride and methyl methacrylate are so high as to be barriers to international trade.

New Capacity—New production capacity in plastics materials is reported by Petrochemicals Ltd., of Partington, Manchester, Eng., now turning out bulk quantities of high-purity Catarex benzene, and toluene of low sulfur and no diolefine content, so that there is no color deterioration in storage, and no foreign color or odor. British Industrial Solvents Ltd., Hull, has added new plant this year for acetates and similar esters. Bakelite Ltd. has installed more plant for producing white and colored urea molding materials at Aycliffe in order to supplement in this plastics category its already expanded output of phenolics. Plans are also proceeding apace for the manufacture of polyvinyl chloride and of copolymer resins.

Squeeze Bottles—Flexible polyethylene bottles are gradually breaking into the United Kingdom packaging field now, the manufacturing rights being held by the Leicester firm of Cascelloid Ltd. The latest product to go into a squeeze bottle that is being marketed on a national scale is the "Odo-ro-no" deodorant.

Large acrylic sheets—Corrugated Perspex is now being made in 10-ft. lengths in certain profiles for export, one of the first consignments going to New Zealand. The maximum length for the normal corrugated sheet used in the United Kingdom is 7 feet.

Packaging Machinery—Advance news of the Second National Packaging Exhibition to be held in Olympia, London, Eng., Jan. 30 to Feb. 9, 1951, pinpoints the increasing interest of British film converters in the latest American equipment, particularly band-type sealers for bag closure, bag-making machines, automatic packing and wrapping machines, and hand- and foot-operated jaw sealers. Several American machines will be demonstrated; this should assist British users in overcoming some of their polyethylene film problems traceable to difficulties of handling this material on conventional regenerated cellulose film type equipment.

Quilted vinyl—Quilted polyvinyl chloride calendered sheet is proving very popular in England for many types of goods, including large mothproof clothes-storage boxes. Advantage in quilting from the making-up angle is that slight defects in the sheet can be hidden.

France

Chemicals—Plastic production in France in 1947 was only 6% of the American total, says the first report of a committee set up to examine the modernization of France's chemical industry. Increased output is called for—but not of low priced poor quality materials. Investment of $4900 million on all chemical plant by 1953 is recommended. Meanwhile, the Societe Naphthachimie reports near completion of its project for producing 10,000 tons of acetone, 17,000 tons of solvents and other chemicals, and 60,000 tons of naphtha per year. Two large installations for producing 10,000 to 12,000 tons each of acetone from propylene are announced by (a) Shell-St. Gobain, and (b) Compagnie Francaise de Raffinage-Ugine-Rhone-Poulence.

Germany

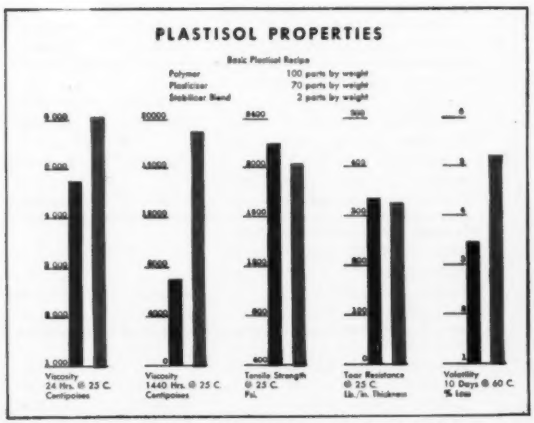
Materials Production—In the war year of 1943, all Germany produced 250,000 tons of plastic materials. A great part of this production was located in what is now the Russian Zone. In 1949, production in Western Germany amounted to 57,000 to 67,000 tons. Production in 1950 may be 10,000 tons higher. . . Among the newly developed plastics in Western Germany is Perlon, a material similar to nylon. . . Western Germany now exports about $370,000 worth of plastics a month. The export of plastic dolls alone amounts to approximately $42,000 a month.

—*Howard Williams*

*Reg. U. S. Pat. Office.

HOW TO GET

IMPROVED QUALITY AND LOWER VISCOSITY PLASTISOLS WITH BARRETT* "ELASTEX" 10-P PLASTICIZER


PLASTISOL PROPERTIES
Basic Plastisol Recipe
Polymer 100 parts by weight
Plasticizer 70 parts by weight
Stabilizer Blend 2 parts by weight
Viscosity 24 Hrs. @ 25 C. Centipoises
Viscosity 1440 Hrs. @ 25 C. Centipoises
Tensile Strength @ 25 C. Psi.
Tear Resistance @ 25 C. Lb./in. Thickness
Volatility 10 Days @ 60 C. % Loss

Key: Black—"ELASTEX" 10-P Plasticizer; Red—di-2-ethylhexyl phthalate

In the manufacture of plastisols for coating and low-pressure molding operations, compounders have long known the value of di-2-ethylhexyl phthalate as a primary plasticizer. Dispersions of vinyl resins in this plasticizer possess good storage stability, and are of moderately low viscosity. The coatings and molded articles produced from them exhibit good physical and performance characteristics.

Now Barrett offers the plastisol compounder an even more efficient dispersant—"ELASTEX" 10-P Plasticizer.

Plastisols prepared with this high quality primary plasticizer possess lower viscosity and better storage stability than do those compounded with equivalent amounts of di-2-ethylhexyl phthalate. At the same time, the fused products exhibit improved physical properties, and are subject to less volatile loss.

If you manufacture plastisols for spread coating, molding, or casting, the superior performance of Barrett "ELASTEX" 10-P Plasticizer is well worth investigating.

✓ **NOTE:** Technical advice on the use of BARRETT Chemicals is available to you through the assistance of Barrett representatives. Why not put your problem up to us? Phone, wire or write.

BARRETT* CHEMICALS AVAILABLE TO THE PLASTICS INDUSTRY

"ELASTEX" 10-P Plasticizer	Dibutyl Phthalate
"ELASTEX" 28-P Plasticizer	Phthalic Anhydride
"ELASTEX" 50-B* Plasticizer	Phenol
"ELASTEX" DCHP Plasticizer	Crystal Urea

Barrett*

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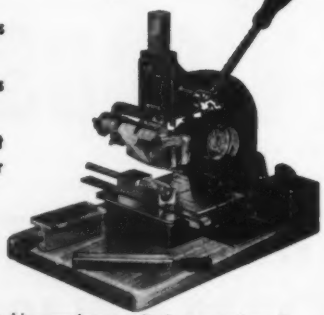

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Write for descriptive literature.

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Production of

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant, for transfer to other plants

PLASTICS AND SYNTHETIC RESIN PRODUCTION
From Statistics Compiled

Materials	*Total prod'n. first 6 mos. 1950*	*Total sales first 6 mos. 1950*
CELLULOSE PLASTIC:[a]		
Cellulose acetate and mixed ester plastics:		
Sheets, continuous:		
Under 0.003 gage	5,588,563	5,405,386
0.003 gage and over	4,145,758	4,167,659
All other sheets, rods, and tubes	2,099,101	1,757,623
Molding and extrusion materials	36,613,343	35,020,576
Nitrocellulose		
Sheets	3,018,770	2,849,321
Rods and tubes	793,637	510,586
Other cellulose plastics[b]	5,831,162	5,949,304
PHENOLIC AND OTHER TAR ACID RESINS:		
Laminating	33,528,302	22,461,127
Adhesives	14,201,813	12,780,434
Molding materials[a]	104,663,551	87,185,227
Protective coatings (containing less than 10% modifier)	10,500,867	8,198,667
Miscellaneous uses (covers casting)	30,098,634	29,964,426
UREA AND MELAMINE RESINS:		
Adhesives	34,196,135	32,414,273
Textile- and paper-treating resins	13,397,360	10,718,447
Protective coatings, modified and unmodified	13,546,288	11,656,392
Miscellaneous uses, including laminating and molding[a]	31,596,068	28,743,659
STYRENE AND STYRENE DERIVATIVE POLYMER AND COPOLYMER RESINS:		
Molding materials[a]	117,540,155	127,169,864
Miscellaneous uses[d]	85,231,511	21,789,331
VINYL RESINS:		
Sheeting and film, including safety-glass sheeting[a]	109,053,214	94,955,747
Adhesive (resin content)	8,618,445	7,828,023
Textile- and paper-treating resins, including spreader and calendering types (resin content)[c]	21,972,605	20,627,694
Molding material (resin content)	56,178,271	52,242,521
Miscellaneous uses (resin content)[c]	11,254,490	6,222,023
MISCELLANEOUS SYNTHETIC PLASTICS AND RESIN MATERIALS:		
Molding materials[a, f]	27,602,143	27,342,168
Protective coatings[g]	31,174,208	31,042,016
All other uses[h]	97,996,568	95,321,277

[a] Include fillers, plasticizers, and extenders. [b] Include sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Excludes data on protective coating resins; these data are included with miscellaneous coating resins to avoid disclosure of

Plastics Materials

of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

IN POUNDS FOR MAY AND JUNE, 1950
by U. S. Tariff Commission

May 1950		*June 1950*	
Production	*Sales*	*Production*	*Sales*
911,090	902,121	974,680	960,081
771,408[1]	757,306	763,200	718,268
297,694	273,243	334,447	321,164
6,518,165	6,113,153	6,602,663	6,344,349
565,499	508,690	544,788	466,658
84,754	79,303	88,031	94,280
897,619	1,012,275	817,114	793,606
6,418,514[1]	4,211,481[1]	6,564,176	4,176,011
2,486,907	2,238,607	2,269,831	1,933,882
17,477,563[1]	14,605,855[1]	17,922,006	15,447,222
1,853,643[1]	1,254,789[1]	2,077,624	1,675,213
5,527,441[1]	5,366,147[1]	5,627,986	6,082,531
6,614,162	7,384,414	6,410,238	5,790,958
1,868,913	1,477,979	2,309,533	1,827,764
2,626,118[1]	2,304,093	2,678,478	2,827,794
6,097,563[1]	5,904,572	6,327,649	5,470,126
20,937,159	23,760,985	20,445,563	23,705,714
4,504,310	3,668,299	4,724,444	3,789,915
18,692,000[1]	17,124,935[1]	16,740,069	15,203,800
1,632,902[1]	1,427,142[1]	1,414,333	1,391,751
3,538,831[1]	3,434,959[1]	3,559,596	3,624,457
9,998,353[1]	9,444,788[1]	9,568,962	8,815,150
1,647,835[1]	823,738[1]	1,711,904	878,006
5,184,594[1]	5,144,794[1]	5,322,382	5,167,048
4,997,367[1]	4,912,795[1]	5,048,756	5,394,065
17,146,717[1]	16,429,090[1]	16,442,285	16,017,647

operations of individual companies. [e] Include data for spreader and calendering type resins. [f] Includes data for acrylic, polyethylene, nylon, and others. [g] Includes data for coumarone-indene, petroleum, silicone, and other protective coating resins. [h] Includes data for acrylic, alkyd, coumarone-indene, nylon, petroleum, silicon, and others for miscellaneous uses. [r] Revised.

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Jiffy Tires go on in less than 5 minutes. No cement, glue, rims, bolts or special tools needed. And, Jiffy Tires are made in sizes to fit any bandsaw wheel. Molded from tread-rubber with steel backbone. Carter products universally accepted as standard equipment by leading bandsaw manufacturers.
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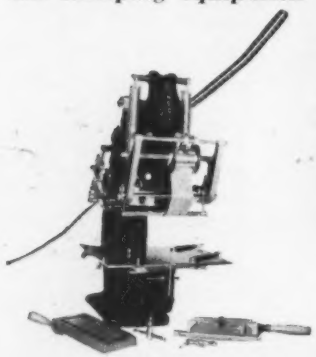
hot stamping equipment



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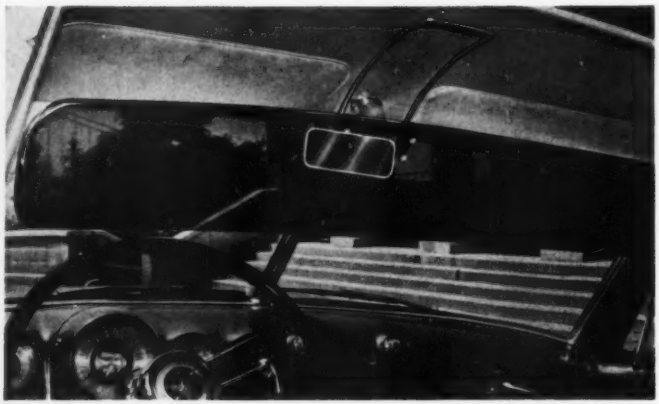
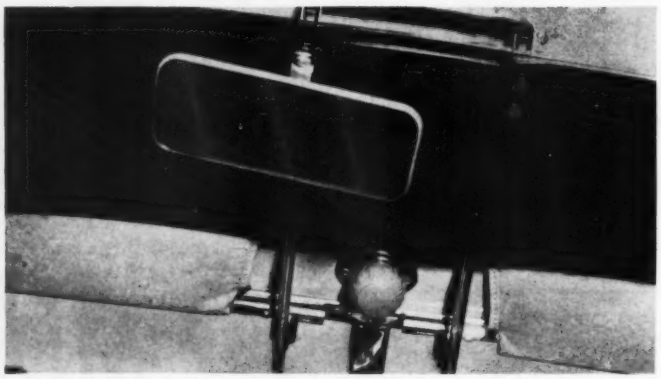


PHOTOS COURTESY ROHM & HAAS CO.

Acrylic visor covers windshield width, yet permits all-around view. Bright glare is reduced, but colors—particularly traffic lights—remain unchanged



Chrome-plated brackets screwed to molding hold visor which moves on slides and may be raised to roof when not used. Extra rear-view mirror is provided

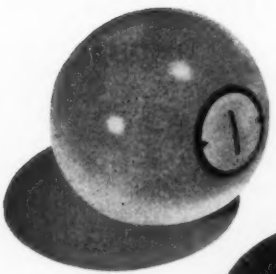
Interior Windshield Visor

TOO frequently, automobile windshield visors reduce the scope of the driver's view at the same time that they fail to provide adequate protection against sun, snow, and road glare. These disadvantages are eliminated by a new interior automobile visor, the Soft Glow, which is produced of Plexiglas by Bassons Industries Corp., Bronx, N. Y.

The visor is made of smoky tan 0.1-in. thick acrylic whose panchromatic nature permits colors—notably those of traffic lights—to be seen unchanged; at the same time, the visor will reduce glare from oncoming headlights and will also reduce heat build-up within the car when the sun is high. Soft Glow, which covers the entire width of the windshield, yet permits an all-around unobstructed view, is permanently installed by two chrome-plated brackets screwed to the windshield molding at top center. A tubular stainless steel slide held by these brackets makes the visor fully adjustable and permits the driver to move it up flat against the car roof when not in use. A tilting action is also provided. An edge rib, formed in three sides of the acrylic, gives added rigidity. Soft Glow comes with rear view mirror.

Easy way to get your vinyl PLASTICIZER PROBLEM out from behind the . . . . .

Why huddle behind the eight ball with a vinyl plasticizer problem when you can solve it so easily . . . so quickly . . . simply by getting in touch with Monsanto? Whether you are developing a new product or improving your present line, it will be worth your while to call in Monsanto because . . .



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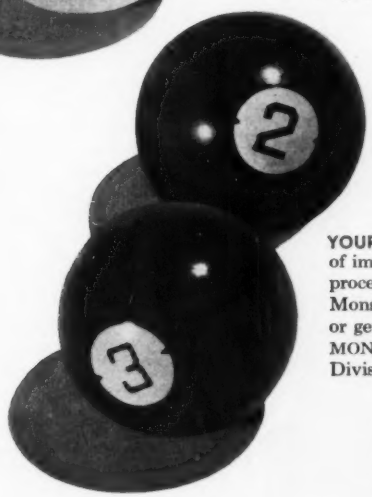

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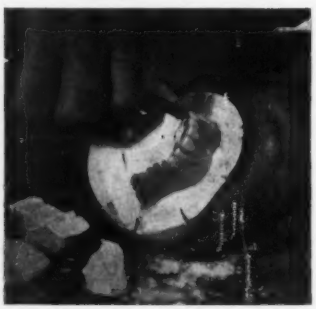
Acrylic resins now go into all or part of 90% of British dentures

British Dentures

WITH the introduction of the National Health Service program in Britain came a greatly increased demand for dentures. As a result, the use of acrylic resins in dentures made in England has risen rapidly. Introduced by Imperial Chemical Industries, Ltd., in 1934, acrylic materials for dental prostheses now comprise all or part of over 90% of such dentures.

The use of fine grain powders enables perfect replicas of natural teeth to be made, even to the extent of reproducing check lines, decalcification faults, and other character markings. Since acrylic teeth and bases unite perfectly, pins or diatoric anchorages are not required, and it is thus possible to reduce the size of the base surrounding the root of the teeth. Acrylic teeth are easily trimmed to shape, do not break in processing or wear, and are used equally well with porcelain or metal.

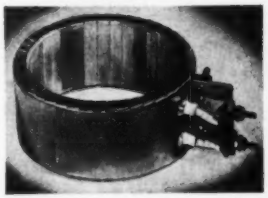
Dentures of acrylic are shaped easily and do not break in processing



HEAT FOR PLASTIC PROCESSING

The correct heat source can be a difficult problem

That extra 100° . . . possibly



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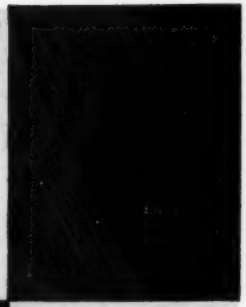

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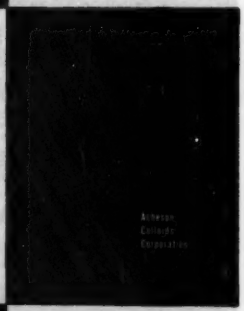

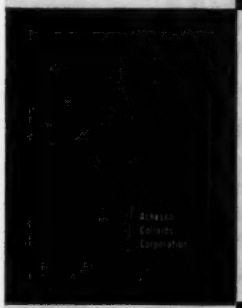

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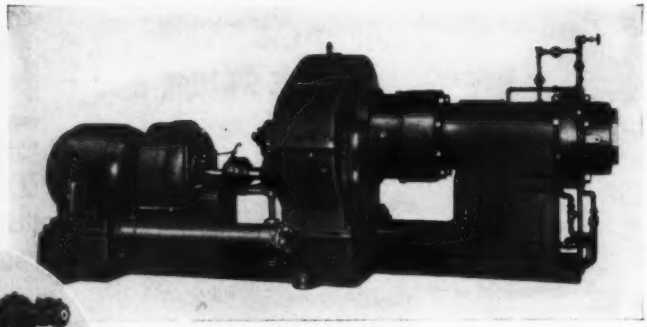
Extruders . . .

The complete facilities of National-Erie engineering, metallurgical control, foundries and machine shops enable us to meet your largest extruder specifications . . . to assume full responsibility for your extruder requirements. At the right is a National-Erie 8" standard tubing machine . . . From blue print to finished machine ready to operate you can depend upon us.



. . . *to* LAB EXTRUDERS

At the left is shown one of our 1 1/2" small production experimental extruders for rubber or plastics. Submit your rubber or plastics machine requirements to us—we shall cooperate fully and promptly.

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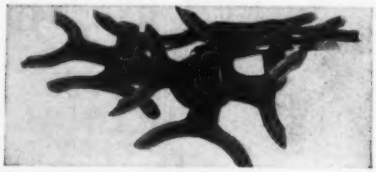

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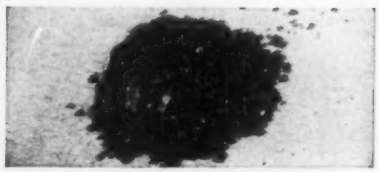

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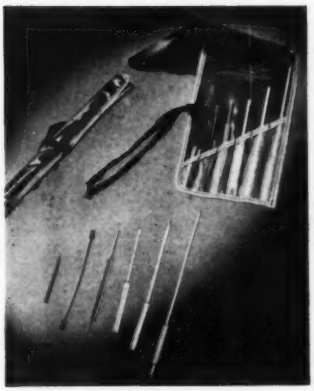

Set of six nylon servicing tools is packed in vinyl roll-up case

T. V. Tools

DESIGNED to speed television servicing operations with a minimum number of tools to fit all types of tuners, trimmers, transformers, and coils is a television alignment tool kit marketed by JFD Mfg. Co., Brooklyn, N. Y. The kit contains six nylon tools, each having a different tuning tip at each end, or a total of 12 separate aligning ends. Five of the tools were injection molded at one time by Teal Molding Co., New Haven, Conn., and the metal tips are inserted after molding. The sixth aligning tool is injection molded from a two-cavity mold with the metal insert molded-in.

Nylon was selected because it offered the best combination of strength and durability needed to withstand the abuse given servicing tools. In addition, flexibility was required because of the narrow working space in certain television set servicing operations. The natural resiliency of the material permits the tools to be bent double and still regain their original shape.

The colors of red, royal blue, orange, yellow, green, and powder blue were chosen for attractiveness as well as to facilitate servicing by providing a key color for each tool.

The blue vinyl case holding the tools in individual compartments is made by Keep-Clean Auto Products Co., New York, N. Y., using 15-gage material which is sheeted from rolls, die-cut to form, and sewn.

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engineered grades for exacting requirements . . . .

Formica engineered grades—made of unusual base materials and bonded with special resins—have the *right combination of properties* for your most difficult laminated plastics requirements. Here's how three alert manufacturers used Formica for product improvement:

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Grade L-41, fine weave fabric base bonded with melamine resins. Highly arc resistant and has good insulating and machining qualities.

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Grade G-6, glass fabric base bonded with silicone resin. High arc and fire resistance, low moisture absorption. Photo courtesy Gilfillan Bros., Los Angeles.

★ **AIRCRAFT RADAR ANTENNA BASE:**

Grade YN-25, nylon cloth base bonded with special low loss resin. High insulation resistance, mechanical toughness, low power loss, excellent moisture resistance. Photo courtesy Wilcox Electric Co., Kansas City.

The Formica line includes dozens of other engineered grades for special applications. For complete information on productive Formica . . . in sheet, tube, rod, postformed and molded form . . . for outstanding mechanical, electrical and chemical (resisting) properties . . . send today for new general catalog just off the press. Address The Formica Co., 4531 Spring Grove Ave., Cincinnati 32, Ohio.

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Model 4 — MacRay Semi-Automatic Machine
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NEW MACRAY 4 oz. machine accommodates larger molds up to 12" x 23", mounted vertically . . . 13⅜" x 20", mounted horizontally.

ALL MACRAY Injection Machines have these features . . .

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S.P.I. Conference

THE Annual National Conference of The Society of the Plastics Industry, Inc. will be held Oct. 18, 19, and 20 in Swampscott, Mass. The theme of the meeting, held in cooperation with the Harvard Business School, will be plastics manufacturing in mobilizing the U. S.

Two sessions will be conducted by professors of the Harvard Business School. The following papers will be presented: "Organized Labor's Quest for Security," James J. Healey; "Executive Development," Myles L. Mace and Sterling Livingston; "Harvard Business School's Plastic Project," John G. McLean; "Creative Effort in Industrial Marketing," Edward C. Bursk; "The Advertising of Plastics," Neil H. Bordon.

Robert Burns of Bell Telephone Laboratories will speak at a luncheon session on "Properties of Rigid Plastics—Use and Misuse." The annual banquet will be held Thursday.

At the Compression Molders Meeting the following papers will be read: "New Frontiers for Impact Materials," Saul M. Silverstein, Rogers Corp.; "The Future for Molds Over 20 Pounds," Dan H. L. Jensen, Philco Corp.; "Compression Molding of Reinforced Plastics," Clare E. Bacon, Owens-Corning Fiberglas Corp.

Papers at the Injection Molders Meeting will include: "Improvement of Thermoplastic Products by Post-Molding Treatments," Stanley R. Melvin, Monsanto Chemical Co.; "A Study of the Mold Pressure Cycle," G. D. Gilmore, The Dow Chemical Co.; "Pre-Plasticizing Equipment for Injection Molding Presses."

The program committee consists of George V. Sammet, Northern Industrial Chemical Co., chairman, and Edward W. Vail, Bakelite Div., Union Carbide and Carbon Corp.; Alfred A. Lawrence, The Dow Chemical Co.; John W. LaBelle, Koppers Co., Inc.; Edmund D. Kennedy, Monsanto Chemical Co.; Sherwood L. Young, C. F. Church Mfg. Co.; John T. Moore, Tennessee Eastman Corp.; Josiah D. Crosby, Hood Rubber Co.; Dr. Howard A. Jones, New England Tape Co., Inc.; Homer C. Simmons, Jr., Hercules Powder Co.

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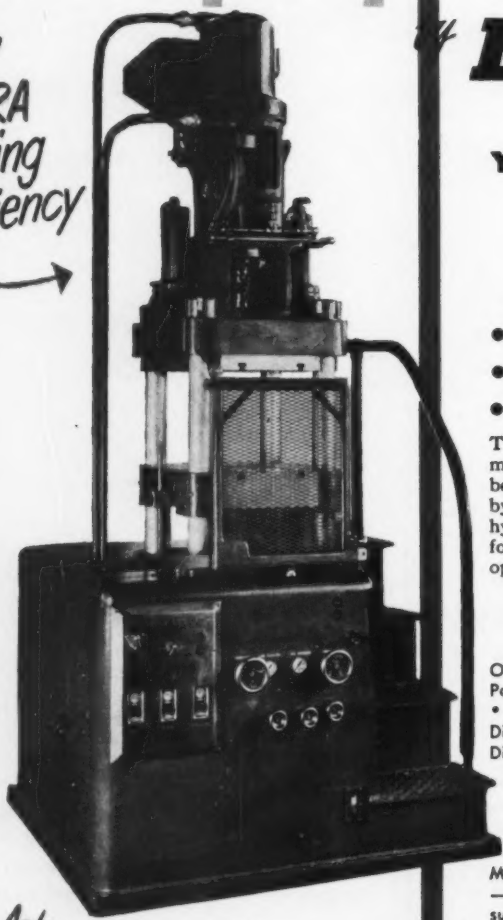
multi-purpose press

for EXTRA molding efficiency



De Mattia

You can use this press

3 WAYS!

- *FOR INJECTION*
- *FOR COMPRESSION*
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This highly efficient vertical injection molding press is designed so that it can be used for compression and transfer work by making a few low cost additions. All hydraulic, it features smooth fluid power for both injection and mold clamping operations.

DE MATTIA VERTICAL MODEL G1

SPECIFICATIONS

Ounces Molded per Shot — 4 (Styrene) • Pounds of Plasticized Material per Hr. — 50 • Capacity of Feed Hopper (Lbs.) — 50 • Diameter of Injection Plunger — 1⅞" • Diameter of Hydraulic Injection Cylinder — 8½" • Pressure on Material — 20,500 lbs. per sq. in. • Size of Die Plates—14" x 23" • Mold Opens — Stroke — 15" • Max. Daylight — 19" • Min. Die Space — 4" • Motor—20 HP @ 1,200 RPM • Pump Capacity —54 GPM @ 1,000 PSI • Mold Closing Pressure (Tons) — 150 • Floor Space Required — 47" x 59" • Height Over All — 108" • Approximate Wt. of Machine (Tons) — 4¼" • Injection Piston Stroke — 7¼" • Closing Cylinder Bore—8 1/16" • Complete Injection Time (Max.) — 1.88 Sec. • Heating Cylinder — 4,350 Watts.

Ask **FOR YOUR COPY OF THE NEW CATALOG NOW**

The new De Mattia Catalog contains complete data on both Vertical and Horizontal De Mattia Presses. Also included is full information and specifications on compact, high capacity De Mattia Granulators and Scrap Grinders.

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New Molded Boats

TWO large Fiberglas-polyester molded boats have recently been placed on the market by Beetle Boat Co., New Bedford, Mass. They are almost twice the size of the largest boats Beetle has previously molded. Both are 24 ft. over-all with an 8½-ft. beam. One model is a cabin cruiser while the second is an open utility boat.

All of the molded parts are produced in shell-like female molds with a technique very similar to that reported in MODERN PLASTICS, September 1949. Because the gasoline tanks, water tanks, ice box and sink, in addition to the hull, deck, and cabin, are molded of Fiberglas and pigmented Laminac, painting will never be required. Because the hull is molded in one piece, the boats will never need caulking. The material has withstood laboratory weathering tests simulating more than 30 years of actual use with no signs of deterioration.

These new boats, according to Carl Beetle, president, will create a small-boat revolution by putting boat ownership within the cost-maintenance range of thousands of new families to whom upkeep expenses have, heretofore, been prohibitive.

Both the cabin cruiser (above) and the open utility boat (below) have hulls produced in the same mold; decks and superstructure are molded separately

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COMPRESSION

TRANSFER

PLUNGER

When you have Fortney make your molds, you are dealing with one of the oldest, most widely experienced moldmakers in the plastics industry. Fortney gives you the type of service you want — precision molds, made at sensible prices.

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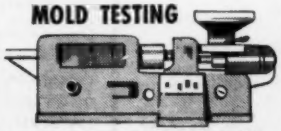

Before shipment, injection molds made by Fortney are tested on our own injection press. They are delivered ready for immediate production.

Phone or write for a consultation on your mold building problem, today.

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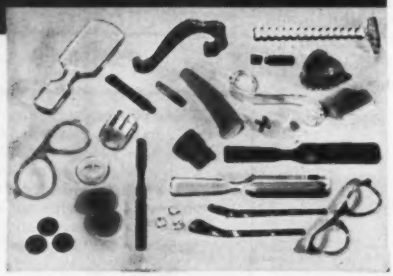

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AND REMEMBER, TUMB-L-MATIC makes *the complete line* of tumbling and burnishing equipment, compounds and supplies.

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Our experienced engineers analyze a sample (or detailed description) of your product, recommend an individualized, low-cost TUMB-L-MATIC PROCESS complete with production data which enables you to figure finishing costs before you invest a cent. Write and tell us about your product—or better still, send a sample.

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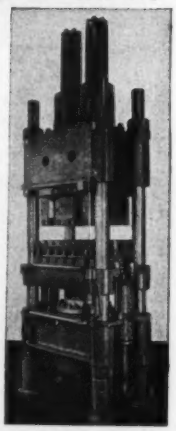
TWO HEADS ARE BETTER THAN ONE



As this double ram transfer molding press has two sprues, the necessity of center gating single cavity molds is eliminated. This feature increases the possibilities for mold design where point of gating is important. It also means better and faster fills on pieces that have heavy sections covering large areas. If desired, only one ram may be used.

Several of these presses are in use at Hemco Plastics Division, Bryant Electric Co., Bridgeport, Conn.

We invite your inquiries.

Dunning & Boschert PRESS CO., INC.

331 West Water Street — Syracuse, New York

Midget Stapler

MANY tasks in homes and offices are assigned to a new pocket-size stapling machine which gains display appeal from its plastics components and sales container. The device, called Tot 50, was developed by Speed Products Co., Inc., Long Island City, N. Y.

This latest addition to the firm's line of Swingline products is made of chrome-finished steel with a top molded of red Tenite II cellulose acetate butyrate covering the barrel. Staples are loaded easily through an open channel provided at the rear of the stapler. Tot 50 is packaged and displayed in a two-piece hinged styrene container. The top of this box is clear transparent, while the base is opaque blue. Both the stapler cover and the package are molded for Speed by K. & C. Experimental Works, Newark, N. J.

Fifty practical uses are claimed for the unit, a figure from which the stapler derives its name. In addition to stapling, Tot 50 is useful as a tacker or plier. When used for tacking, the base is merely flipped back.

The stapler is marketed as an advertising specialty as well as a personalized gift. When purchased as a promotion piece, the name of the individual or distributor is imprinted on the butyrate top.

The tool will staple up to 20 sheets of paper at a time, and carries 50 staples. Compartments in the blue styrene package base hold the stapling machine and a reserve supply of 1000 staples.

Midget stapler has butyrate top, is packaged in styrene container

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It's a good feeling, one we'd like to share with you next time you need injection molding assistance.
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Minijector

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The Duplimatic Minijector is ideally suited for high-speed production for molding any insert. The Duplimatic is all hydraulic and completely automatic. The lower mold section has a complete duplicate set of cavities and is mounted on an automatic positioning bed. A single operator handles all operations. While one mold is being loaded the other mold is closed and receiving an injection charge. Automatic Knockout pins eject molded parts and mold is ready to be reloaded. It is available in 2 oz. and 4 oz. injection capacity with a mold casting area from 20 to 40 sq. inches with an injection pressure of 16,250 to 20,000 p.s.i. We invite your inquiry — write today for further details.

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The Complete Moslo Line Includes:

- The Moslo ¼ ounce hydraulic or hand operated Minijector.
- The Moslo 2, 3, and 4 ounce Universal Minijector.
- The Moslo Duplimatic Minijector.
- The Moslo No. 60 Plastic Granulator.

*Pat. Pending

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star background; and a reindeer ornament and door decoration. Each piece is molded in deep drawn third-dimensional form and becomes even more striking when backed by an electric light on a Christmas tree, or over a mantel or on a door.

The brilliant colors of all four decorations are reported to be fast under winter weather conditions, and the ornaments are non-warping, scratch-resistant, and so light in weight that they are easily attached to a wall or Christmas tree. After the holidays are over, they can be washed and stored for next year.

The Santa comes in two sizes, 18 by 23 in. and 13 by 19 in., each with either a small hole at the top for tacking or with a metal crossbar and clip to hold an electric light socket. The angel is 11 by 11 in., and the reindeer, pictured above, is 15 in. by 17½ inches.

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reased visual appeal
opening new markets
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For use with Polystyrene, cellulose acetate, cellulose acetate butyrate, methyl methacrylate, polyethylene, vinyl.

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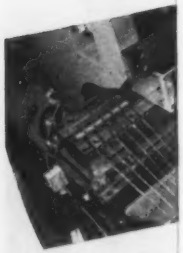

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Three-dimensional lithographs on vinyl make realistic decorations

Vinyl for Christmas

CHRISTMAS will be a lot brighter this season when a series of three-dimensional decorations makes its bow. Lithographed in full color on non-flammable rigid Vinylite sheets by a patented process called the Triographic method, the ornaments are being offered by Stanley Wessel & Co., New York, N. Y., which developed this technique and now uses it exclusively.

Four different designs make up the series: Santa Claus' jolly face wreathed in a smile; the same Santa in a Christmas wreath on a die-cut star background; an angel on a star background; and a reindeer ornament and door decoration. Each piece is molded in deep drawn third-dimensional form and becomes even more striking when backed by an electric light on a Christmas tree, or over a mantel or on a door.

The brilliant colors of all four decorations are reported to be fast under winter weather conditions, and the ornaments are non-warping, scratch-resistant, and so light in weight that they are easily attached to a wall or Christmas tree. After the holidays are over, they can be washed and stored for next year.

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Application of Westchester Pearlescent Concentrates to a wide range of familiar designs increased visual appeal dramatically . . . helped materially in opening new markets and increasing sales to existing outlets at remarkably low cost.

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For use with Polystyrene, cellulose acetate, cellulose acetate butyrate, methyl methacrylate, polyethylene, vinyl.

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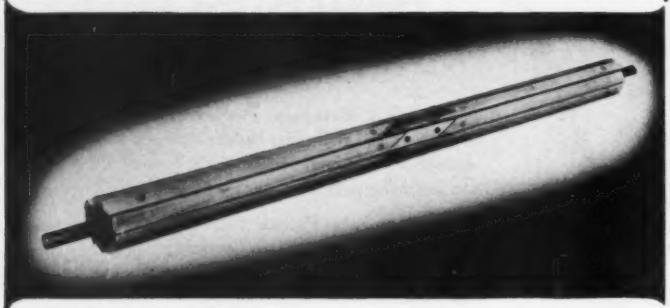

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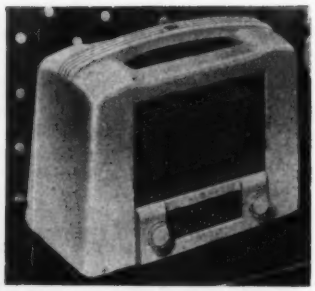
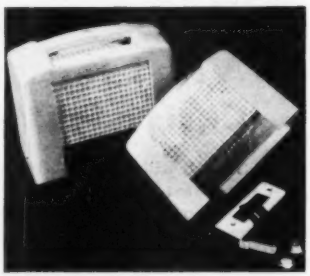


Molded styrene grilles are solvent-cemented to styrene radio cabinet



Two cabinets removed from chassis to show speaker, top, back grilles

Lattice Grille

RADIO speaker grilles and ventilation panels are the principal applications of a thin lattice sheet being injection molded of cellulose acetate, butyrate, or styrene by E. K. Cole Co. Ltd., Southend, Essex, England. The full-size lattice sheet—an 8-oz. shot—measures 198 sq. in. in area, and contains 12,672 perforations, each one symmetrical and free from flash. The grille's large surface area in relation to its thickness requires an injection pressure of 27,000 p.s.i., a clamping pressure of 600 tons, and carefully controlled mold temperature.

The lattice was originally developed for making loud speaker, top, and back grilles for the styrene-housed Ekco radio. For this use, the grille is produced in styrene to facilitate attachment to the cabinet by the use of hydrocarbon solvents; thus the three pieces of grille can be solidly welded into position. The radio cabinet is injection molded in various colors on a 32-oz. machine.

Double Tumbler

HOT drinks keep hot and cold drinks stay cold longer in the versatile new Therma-Glass tumblers molded of high heat-resistant styrene by Gits Molding Corp., Chicago, Ill. Each tumbler is actually two separate sections, one of which snap-fits inside the other to form a single double-walled container. The air space between the two walls serves as an insulator which prevents the tumblers from sweating, and therefore eliminates the necessity for coasters. In addition, the break-resistant plastic, which can withstand temperatures up to 180° F., retains heat or stays cold for longer periods without permitting the outer surface to become uncomfortable when picked up by the user.

The two parts of the tumbler can also be used separately or can be fitted together at the tops so that the tapered mouth of the inner tumbler makes a tight seal with the mouth of the outer container, forming an individual shaker for cocktails, milk shakes, or malteds.

When the tumblers are used together, a slip of paper inserted between the walls will identify either the contents or the person using the container. Gits produces the Therma-Glass in transparent red, green, yellow, and blue. The colors can be mixed to form attractive combinations. Tumblers are either packed singly in a re-usable polyethylene bag or boxed in sets of four or eight in a printed foldin counter display package with a die cut riser.

Tumblers can be nested, used alone, or joined to form shakers

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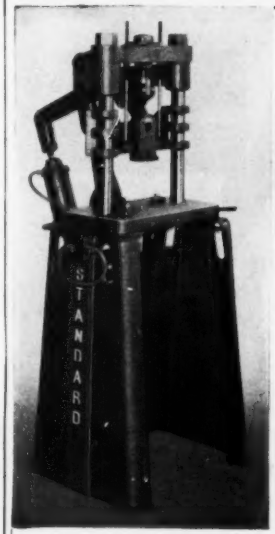

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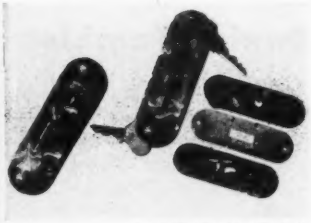

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PUSH-BUTTON selection of any of four keys is possible with a key case made by Bennetch Mfg. Co., Lebanon, Pa. The molding material is Hercocel E, Hercules Powder Co.'s ethyl cellulose, which provides the strength and resiliency needed for the application. Slight pressure on any one of four buttons, each shaped to suggest the key it controls and mounted in pairs on the opposite sides of the case, releases the desired key. A wheel-shaped button, for example, controls the auto ignition key.

Manufacturers' Literature

When the Manufacturers' Literature page of MODERN PLASTICS was introduced 15 months ago, we were frankly overwhelmed by the number of requests received. As a result, we were insufficiently prepared to process the enormous volume of mail as rapidly as we would have liked and, in consequence, considerable delay was often experienced before readers received the literature they requested.

This situation has now been corrected. A new system has been scientifically planned for handling your requests and is in operation right now. When the return post card you fill out is received, it is processed in a minimum of time and your name and address quickly forwarded to the firm concerned.

A recent survey indicates that this department is used regularly by a large majority of MODERN PLASTICS readers. To those who have not yet taken advantage of this service, a cordial invitation is hereby extended to do so.

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To obtain any of the booklets or catalogs listed below, simply circle the corresponding number on the post card, fill in the information requested, and mail.

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CONTROLLABLE CAPACITY PUMPS. Applications, standard sizes and ratings, and data on power costs are included in this eight-page booklet covering pumps produced by The Aldrich Pump Co. (10-1)

CONTINUOUS MIXING. The "Entoleter" continuous mixer and its advantages, together with specifications and diagrams, are presented in a four-page folder. Entoleter Div., The Safety Car Heating and Lighting Co., Inc. (10-2)

HAND OPERATED PRESS. Illustrated bulletin describes 1-oz. manual press reported to be ideal for research, small jobs, and training. Specifications and features are included. Van Dorn Iron Works Co. (10-3)

SMALL-PRODUCTION AND LABORATORY PRESSES. The many uses of these small-production and laboratory compression presses are presented, together with complete specifications. Four-page folder. Elmes Engineering Works of American Steel Foundries. (10-4)

DIE SINKING AND HOBBING PRESSES. Watson-Stillman 200- to 3000-ton hobbing presses are presented in this eight page booklet, with complete specifications and features. Other plastic molding equipment produced by the same manufacturer are also described. Watson-Stillman Co. (10-5)

PRODUCTION EXTRUDING MACHINES. Features, specifications, and other important information on the 3¼- , 4½- , and 6-in. production extruding machines produced by John Royle & Sons. (10-6)

PLASTICS MACHINERY AND TOOLS. Six bulletins giving specifications and features of various presses, cutters, sawing machines, etc. used in the plastics industry. Prices are included. Barker-Davis Machine Co., Inc. (10-7)

ENGRAVING MACHINE. Machine specifications plus illustrations of master copy type for use with the Portable Pantograph Engraving Machine for sunk engraving. Advantages, features, and other information. New Hermes, Inc. (10-8)

PROCESSING PLASTICS. Matched production units, consisting of Banbury mixer, mill, and calender, for producing plastic film and coatings are described in this illustrated bulletin. Complete specifications are given. Farrel-Birmingham Co., Inc. (10-9)

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PROPERTY VALUES OF 17 PLASTICS. Two-color chart showing range of property values for 17 rigid plastics with a comparative rating for each property of each material. Koppers Co., Inc. (10-26)

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HYCAR AMERICAN RUBBER. Discussion of the properties, processing, and uses of Hycar polymers as plasticizers of polyvinyl chloride. Technical data tabulations are given. Five-page bulletin. B. F. Goodrich Chemical Co. (10-29)

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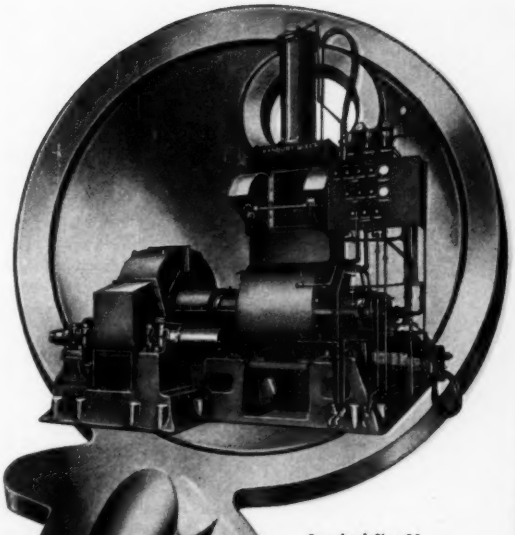

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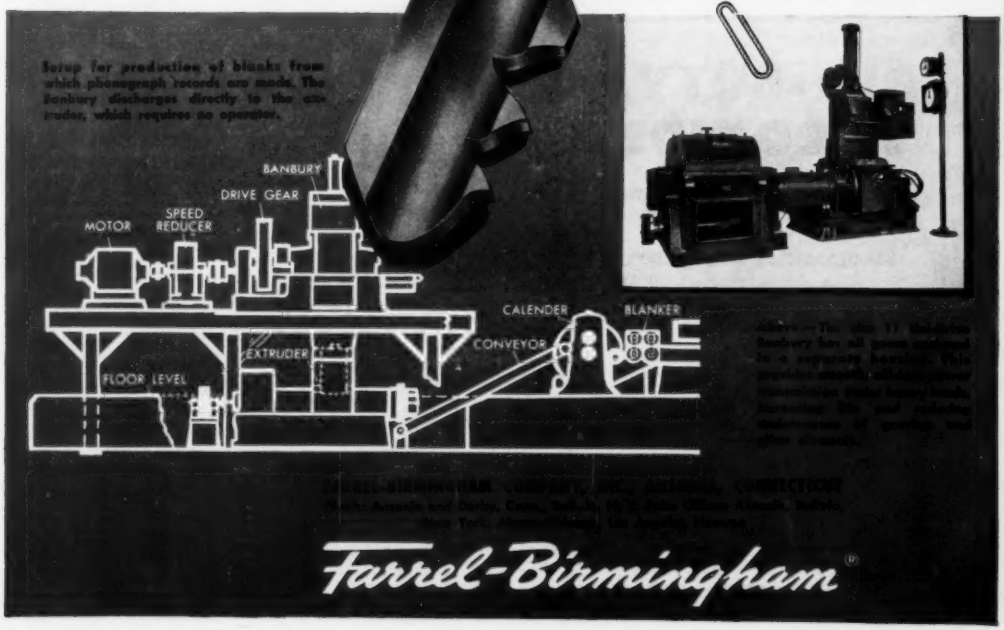
Plastics Banbury Mixer

Write for further information about the Banbury mixer or for engineering assistance in designing an efficient processing layout.



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(*Continued from pp.* 83-86)

to compress the material to 75% of its normal thickness. The compression resistance of the foamed vinyl varies from 2 p.s.i. to 60 p.s.i.

The material is produced in sheets or in molded shapes. There is no theoretical size limitation on the sheets and they can be produced on the company's available equipment in sizes up to 36 by 15 by 7 inches.

The molded shapes are produced on standard compression molding presses. The molds are "undersize" —that is, the cavities are the exact shape of the item to be molded, but are smaller in size than the object will be after it expands. The molding material—a formulation involving a plastisol and a blowing agent—is introduced into the mold and pressure applied. The object is chilled before removal from the mold, then gradually warmed to the point of softening. As the object softens, it expands a controlled amount. This expansion is so uniform that the molded shape is not distorted.

An example of the commercial possibilities of this expanded material is found in an ice bucket which Sponge Rubber Products is molding and marketing as a proprietary item. The bucket, called "'n icer," is reported to retain 40% of ice unmelted after 19 hr. at room temperature. The bucket is also used for hot foods; temperature of near boiling coffee will drop only to 195° F. after half an hour in the bucket.

The insulating value of this vinyl foam material is effectively demonstrated by this application. The manufacturer believes that the material (it has a K factor ranging between 0.20 and 0.25, depending upon density) has a future in the field of specialized insulation applications.

On the basis of its experience in the field, Sponge Rubber Products feels that the vinyl foam also has a future in competition with cell-tight rubber in flotation applications and in many industrial applications. Fish floats and boat fenders have been produced on a laboratory basis.

Another type of vinyl foam, a multiple-celled material similar to sponge rubber in appearance and texture, is being produced on a limited scale by Nomad Co., Longmont, Colo. The company can produce slab material from ¼ to 1 in. thick in sheets up to 24 in. square. Various foaming methods are used.

The chief application of the Nomad material to date has been to fill the space above collapsed lungs in tubercular surgery.[5] A second possible use for the material is as a padding in orthopedic and prosthetic devices.

Urea Foam

Urea foam is produced under the trade name of Flotofoam by the Flotofoam Dept., United States Rubber Co., Chicago, Ill. The material is being promoted primarily for insulation applications. It has a K factor of 0.18 and a density of 0.8 lb. per cubic foot. It can be made in densities ranging from 0.5 to 1.5 lb. per cubic foot.

[5] "Vinyl Sponge Replaces Lung," Modern Plastics 27, 104 (April, 1950).

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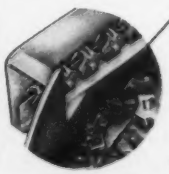

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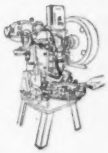

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Flotofoam is available in blocks and panels of various sizes for use in cavities of regular shape or in shredded form so that it can be poured, hand-packed, or blown into irregular cavities.

Block Flotofoam is being used as insulation material in refrigerated showcases made by the Weber Showcase & Fixture Co., Inc., Los Angeles, Calif. This company says that the material is a better insulator than glass fiber, is lighter in weight, and is easier to handle.

Other Materials

Cellular cellulose acetate. Expanded cellulose acetate, or cellular cellulose acetate (sometimes shortened to CCA) was once produced under the trade name Strux by E. I. du Pont de Nemours & Co., Inc. Recently Du Pont, which had previously suspended production of the material, licensed Aircraft Specialties, Inc., Hicksville, N. Y., to manufacture the material.

Production of Strux by Aircraft Specialties is just getting under way. The material will be extruded in either shapes or boards ½, ¾, or 1 in. in thickness and in widths up to 8 in. and lengths up to 10 feet. The new producer feels that the material will find applications in flotation and as a core material for sandwich constructions of low pressure laminates such as are used in radomes.

Alkyd di-isocyanate foam. The Navy is investigating the mechanical and electrical properties of alkyd di-isocyanate foams for foamed-in-place radome cores. All other available plastic foams have been rejected for this application and the Navy is thus pinning its hopes on the isocyanate material which seems to have no civilian possibilities at present because of its cost. The reacting ingredient (meta toluene di-isocyanate) is being produced only in experimental quantities and costs $7 per pound. However, this cost could be reduced with volume production and the foam material might then begin to have possibilities for commercial application.

Conclusion

What does it all add up to? Where do plastic foam materials stand today? Obviously the batting average of the foam team is low. Styrofoam has slammed a home run right over the fence, but the other members of the team have not yet made hits. But these are all rookies and they can't all be expected to hit safely right away. The ball game is not over yet; the plastic foams are still fighting—and the odds are they will have their innings.—END

Calendering

(*Continued from pp.* 88-91)

more difficult to pull off. A stretched or strained product is the result. The film or sheet is generally conveyed too, over and around four or five rolls through which water is circulated, but not too fast or the water won't take off enough heat. Caution must also be taken lest the film be chilled too suddenly. Refrigerated water is not good unless the building is air conditioned, because it will cause condensation on the surface of the roll. If the rolls are not spaced just right and synchronized with the calender speed, the film will stretch and strain. Some operators place them as closely together and as close to the calender as possible and still leave working space. Other operators insist on placing the cooling rolls at some distance from the calender so that the film can have a chance to "temper" and thus avoid stresses. Cloth- or paper-coated drums are often used to avoid the possibility of the plasticizer condensing on the surface of a steel drum.

After cooling comes one of the most ticklish operations in the whole setup: the wind-up. Buyers of film should be well aware of this operation since it is here that film is more likely to stretch, wrinkle, and develop air bubbles and uneven tension.

Film producers have spent years attempting to devise better wind-up procedure, and it is doubtful that anyone is completely satisfied with results even now. The trouble has multiplied as speed of calendering has increased.

The latest equipment for fast wind-up includes a type of festooning. The roll of film is threaded from the cooling rolls to a festoon compensator equipped with dancer rolls which move up an down in a vertical frame and permit the web to feed out onto the wind-up roll under controlled tension. The dancer rolls are controlled by weights and govern the speed of the web so that tension is always the same. When it leaves the festoon, the film or web passes over an idler roll to the wind-up roll where it is cut by an automatic air-actuated hot knife at a predetermined length. The wind-up roll is one of two mounted on a turret frame, so that when one is full it is simply turned to the rear position, and the empty roll moves into the front position ready to take on its load. Calender, cooling rolls, festoon compensator and turret wind-up are all synchronized to operate at similar speeds. It takes exceptionally high grade engineering knowledge and long experience before all these various units can be successfully synchronized.

The customary roll of film generally contains about 300 yards. It is difficult to wind up in smaller quantities, but the manufacturer of a new wind-up system has just announced that he can install equipment for wind-up with a unique air-controlled operation that provides a magazine of eight or ten tubes, each of which can be wrapped with as little as 30 yd. of film.

Compounding his raw materials is another example of the fine art and know-how that any calenderer

(*Continued on p.* 172)

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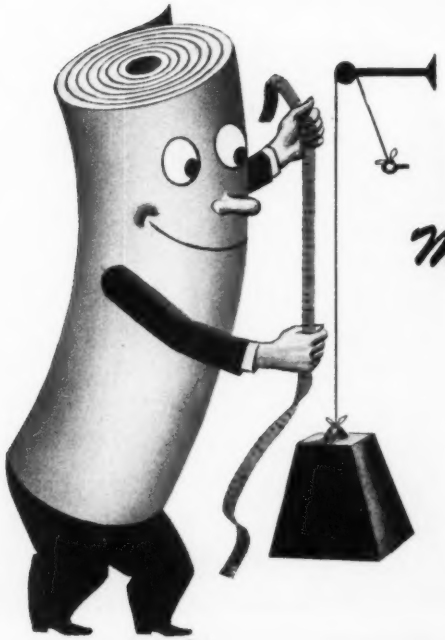

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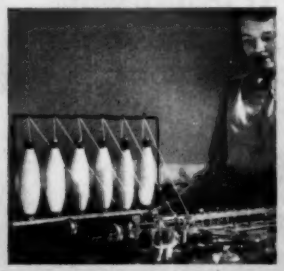

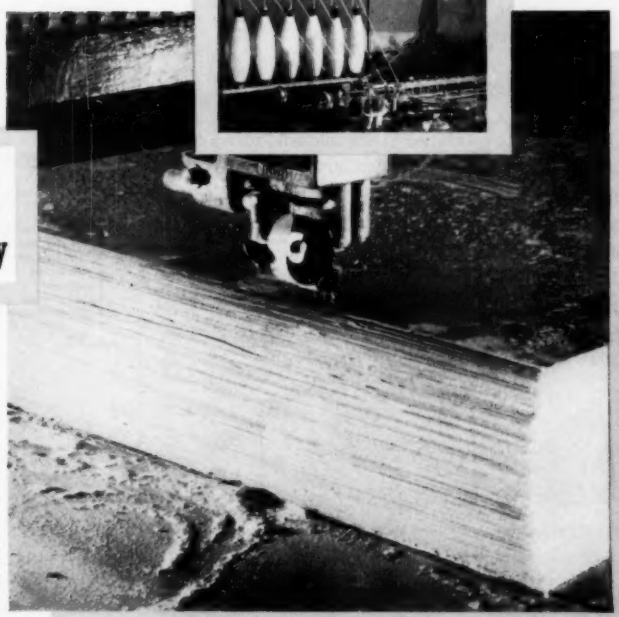

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The same thing can be said of the scores of automatic controls installed for various purposes. It has often been said that some firms have so many controls installed that they interfere with each other; but they are all built in for the purpose of making more and better vinyl film or sheet at lower cost.

Improvements are coming along rapidly, and it is quite possible that in 10 years time vinyl calendering will be as different from today as vinyl calendering is from rubber calendering at the moment of writing.—END

Table Top

(*Continued from pp.* 111-120)

the specimen were remeasured.

Angle of Slide—Two specimens, 4 by 24 in., were prepared by cementing each to a 2- by 4- by 24-in. white pine block which had been previously planed parallel on four sides and shellacked. The table top material, so mounted, was placed on the Material Laboratory Inclined Friction Machine, shown in Fig. 8, and leveled by means of leveling screws set in the vertical supports. Two standard sliding surfaces, cut 4 in. long from a ¼-in. thick Class 1 (18% chromium, 8% nickel) 2-in. wide stainless steel strip,[10] were machine-ground parallel to produce a surface finish with a range of 50 to 80 micro-in. RMS and an average of 63, measured by means of a profilometer. The leading edges of the sliding surfaces were rounded off.

The standard sliding surfaces were prepared to simulate the bottom surfaces of stainless steel mess trays.[11] A load of 2½ lb. was applied uniformly to the 2- by 4-in. sliding surface. With the indicator set to zero on the graduated scale, the assembled test block was slowly raised until the weighted sliding surface resting on the table top material began to slide. The angle necessary to initiate sliding was read to the nearest ½° on the attached scale. The coefficient of static friction was determined from the tangent of the angle.

Flammability (1)—Three specimens, 12 in. in length, 1 in. in width, and the thickness of the material as received, were prepared and marked into rectangles ½ in. on a side before the test was started. A test specimen was then centered and suspended within a sheet-metal shield as shown in Fig. 9, by means of a spring-type paper clamp. The shield, which was 12 in. in width, 12 in. in depth, and 30 in. in height, was open at the top and was provided with a ventilating opening approximately 1 in. in height around the bottom. A viewing window, which could be raised and lowered to facilitate the mounting and igni-

[10]The stainless steel strip was obtained under references (2) and (7).

[11]The mess trays conformed to reference (10).

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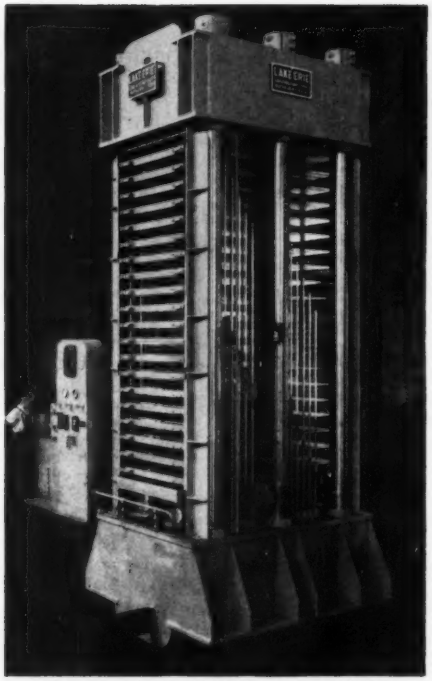

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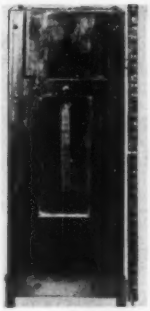
tion of the test specimen, was built into one side of the shield and was of sufficient size and so located that the entire specimen was visible.

Benzene drop method of ignition—A drop of ordinary laboratory grade benzene was placed on the test specimen approximately ¼ in. above the lower edge of the specimen, and allowed to run down to form a drop on the blunt end without dripping off. This drop was ignited within 7 sec. after application to the test specimen by means of a safety match. After ignition, the window of the shield was closed immediately. The time required for the flame either to extinguish itself or to completely burn the test specimen was determined by means of a stop watch, started at the instant of ignition of the benzene drop. The area of the specimen that was burned or charred was measured to the nearest ¼ sq. inch. The markings on the specimen were used for estimating the amount of material burned. If the material melted and dropped from the specimen, the area melted was included in the burned area. The charred portion which dropped off when touched with the fingers or in handling was also included in the burned area. A second set of three specimens cemented to 1/16-in. sheet aluminum of the same width and length as the test specimen, were similarly rated.



9—In flammability test, specimen is centered and suspended by spring-type paper clamp in metal shield

Wooden match method of ignition—Evaluations for flammability were also made on specimens with and without the aluminum backing, using a wooden match as the flame source. The flame was impinged on the blunt end of the specimen, and the time for ignition was recorded. After the specimen ignited, the flame was removed. Observations were made as to whether the material was self-extinguishing or supported combustion. The area of specimen that was burned or charred was measured as described under the benzene drop method. The same apparatus was used as is shown in Fig. 9.

Cigarette Burn Test.—Three burning cigarettes were laid at random on a 6- by 6-in. specimen of the material secured by an adhesive to an aluminum backing, and were allowed to remain there until consumed or self-extinguished. The butts were then removed and any damage observed and reported. If there was a stain or discoloration the specimen was washed with strong soapy waters, dried and observed as to surface condition.

Solubility in Acid, Alkali, and Organic Solvents.—The solubility of specimens of the material,[12] 2 by 1

[12]The backings of those materials with backing were removed prior to weighing before immersion.

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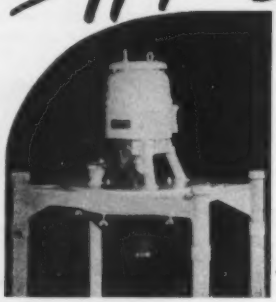

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in., after 4 hr. immersion in various solutions, was determined by measuring the change in weight and reporting the change in weight as percent solubility. Any observations as to noticeable changes in appearance of the specimens were also reported. The temperature of the solutions was 25° ± 2° C. The specimens were weighed to the nearest 0.1 mg. on an analytical balance.

Food Stains.—The resistance to food stains was tested by applying small quantities of mustard and catsup to separate areas on the surface of a 6- by 6-in. specimen. After the respective areas had been allowed to stain for 24 hr., they were scrubbed with a hot (60° ± 2° C.) 1% solution of soap powder in water and observed for penetration and residual stain.

Writing Surface—The ability of the materials to act as a writing support or desk top was noted.

Acknowledgments

The authors wish to acknowledge assistance of the following engineers of the Materials Laboratory, New York Naval Shipyard, who conducted or supervised various phases of the test program which made this article possible: Messrs. S. E. Yustein, S. Weiss, J. Richolson, A. J. Berger, L. J. Greenwald, R. R. Winans, and G. J. Dashefsky, of the Constructional Materials Section of the Mechanics Branch and the Rigid Plastics Section of the Mechanics Branch. The generous assistance of Messrs. N. C. Wiley and A. J. Ward, Code 631 of the Bureau of Ships, in selecting and recommending materials for laboratory and service test and their keen interest in the subject is greatly appreciated by the authors. It is also desired to acknowledge contributions by the various industrial concerns who worked with the Bureau of Ships in this investigation and who furnished materials for test.

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THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

Selling Plastics to the Government

MILLIONS of pounds of plastics are going to be processed for the government by the plastics industry regardless of how far this defense program extends. Even if total mobilization of Armed Forces doesn't materialize, there will be a build-up of supplies sufficient to meet any emergency. It is obvious then that all types of plastics operators should do a little scouting to determine the lay of the land before large scale government orders really start to roll.

The art of selling to the Government is by no means like taking an order over the transom. Processors will have to work at it just the same as they do with private customers, but with a different technique.

Where to go—If at a loss as to how to proceed, one of the first things to do is to get in touch with one of the U. S. Dept. of Commerce regional offices of which there are 42 scattered throughout the country. At each office there is a Government Procurement Manual which gives a listing of what the Government buys, who buys it, and where the procurement office is. An aide will help any manufacturer interpret and study this complicated manual. The Dept. of Commerce in Washington also sends out procurement information to 2000 cooperating offices. These may be local Chambers of Commerce, Trade Associations, or state offices that are interested in industrial development and employment work. If a manufacturer doesn't know where to find one of these cooperative offices, he can probably find out from his local Chamber of Commerce.

The procurement data which the U. S. Dept. of Commerce sends to each of the 2000 cooperating offices consists of the opening date for bids on specified items that are to be purchased as well as lists of contracts that have been let when the amount is more than $25,000, provided the item is of non-security nature.

Valuable Information—Since the plastics industry works closely with prime contractors for its "parts" business, these lists of contracts that have been let will give information on a prospective prime contractor who may want plastics parts. For contracts or sub-contracts on secret items, the procedure for a plastics producer is more complicated. He must then seek out the technician or plastics development man in the branch of service which uses the item and inform him of what he can do and what his experience has been in the past. In this way he may also be informed of prime contractors who are working on secret projects that may require plastics parts—that is, he may be so informed if the government technician thinks the processor has something which the prime contractor can use. Nearly every branch of service has a plastics laboratory with technicians who are well versed in plastics.

It is not an easy job for a processor who has never held a Government contract to do this investigative work, but it may prove fruitful, especially if the processor is skilful in originating and adapting complicated methods of procedure for handling plastics materials. The man who talks to the government in this case should be a technician who thoroughly understands every possible operation that can be performed in his plant. In addition, the company representative should be able to discuss his firm's manpower situation; financial position; security plans such as fences, guards, etc.; and prove he can be trusted with confidential information.

Small Business Conferences—Plastics plant operators should watch closely for notices of the government's Dept. of Commerce meetings which are called Government Small Business Conferences. They are being held today in various cities all over the country and are set up to inform business men of procedure to be observed in government procurement.

If in Washington for the first time looking for business, a business man should go to the Central Military Procurement Information Office, Room 3D760, The Pentagon. While there, he will receive an initiation into the complexities of getting around to see the persons most concerned; but after the initial contacts have been made, the business of finding the right man is no more difficult than in any large firm.

Trips to Washington, D. C., should be cut to a minimum, however. All local facilities and regional offices should be visited first—the government has gone to great expense to disperse its procurement facilities and is hopeful that this will limit the necessity for numerous trips to Washington. It is also inadvisable to visit Senators and Congressmen in the capital city—they are busy men with no time to handle their constituents' individual procurement problems and they generally dislike to intervene in production technicalities that are primarily the business of the Armed Services.

Booklets Available—The same Central agency named above has a large flock of booklets to send out on how to sell various branches of the services. These publications give addresses of procurement offices, etc., but unfortunately they are lacking in some of the specific information needed by the plastics industry. The booklets are entitled "How To Do Business With" or "How To Sell" the Navy, Quartermaster Corps, Medical Corps, and all the other branches. Each is a separate booklet and may be obtained at a small fee from either the Central Office in the Pentagon or from the Government Printing Office, Washington, D. C.

The Chamber of Commerce of the United States, 1615 "H" St., Washington, D. C., which has no connection with the government, also publishes a booklet, "Selling to the Government," which can be obtained for 50 cents. This is a fine, condensed treatise on the subject

* Reg. U. S. Pat. Office.

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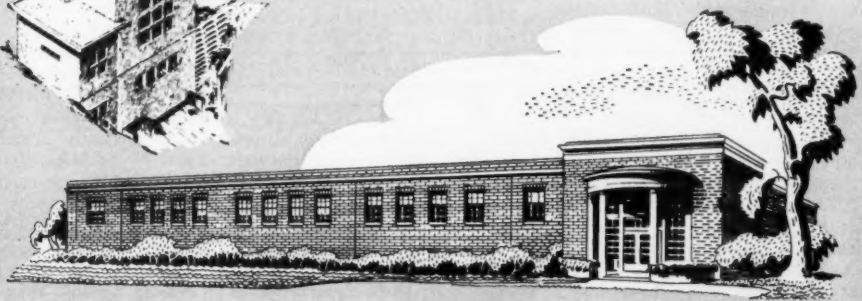
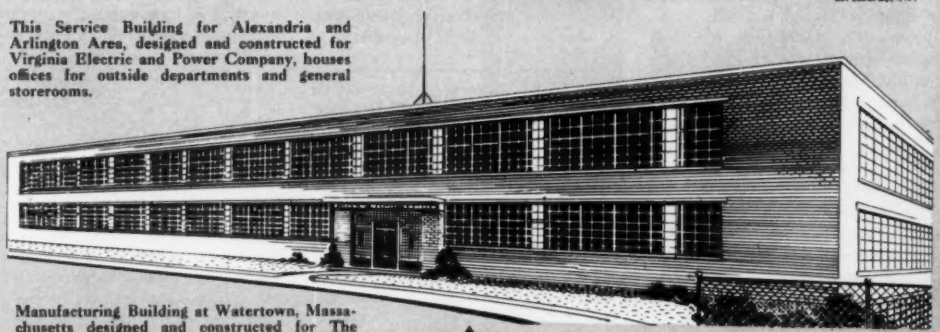


This Service Building for Alexandria and Arlington Area, designed and constructed for Virginia Electric and Power Company, houses offices for outside departments and general storerooms.



Manufacturing Building at Watertown, Massachusetts designed and constructed for The Prudential Insurance Company for occupancy by Manning, Maxwell & Moore, Inc. The total floor area is 136,000 sq. ft.

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which gives lists of procurement offices, who buys what, where to obtain specifications, laws concerning government regulations, and other valuable data.

Imported Chemicals Aid Domestic Production

THE important part that imported chemicals have played in the plastics supply situation is partially revealed in the recently released Bureau of Census figures for imports which show that 3,203,289 gal. of benzol were imported into this country in May. More than 2,166,000 gal. came from Poland and 919,238 gal. from Great Britain. The balance was from Canada. There had been no other imports from any country other than Canada this year previous to May, and the total of all Canadian benzol imports for the first five months was 440,000 gallons. Late reports say that benzol from Poland or any other spot from behind the Iron Curtain have now been cut off, but other imports of European benzol may run around 2 million gal. a month for a year or so.

The total value of the May benzol imports from Europe was $763,147. This European material is motor grade or unrefined benzol and has to be refined in this country.

The tariff on benzol was removed over a year ago, but not only is a premium price paid for refining European benzol, but it takes about one million gal. to make 700,000 gal. of refined benzol. When all these factors are added together, it is said that foreign benzol may cost as much as 40 to 50¢ a gal. by the time it is ready to turn into phenol or styrene monomer, in contrast to domestically made coke-derived benzol at 30¢ delivered in the Gulf area.

Naphthalene—Another chemical of interest to plastics coming to this country in great quantity from Europe is naphthalene of which some 59 million lb. were imported in the first five months of 1950 in comparison to 50 million lb. in the entire year of 1949. Principal contributing countries were Germany, Czechoslovakia, Netherlands, and the United Kingdom. Late reports on this material state that later months will show a decline not only because of the Iron Curtain ban, but because foreigners are holding in anticipation of higher prices.

Other import figures of chemicals in which the plastics industry are interested are given in Table I.

Table I—Imports of Chemicals Used in Plastics Industry Compared to U.S. Production of Same Chemicals for First Five Months, 1950

	Imports	*Domestic production*
Benzol[a], gal.	3,525,000	74,313,000
Naphthalene, lb.	59,003,000	153,546,000
Cresylic Acid, lb.	1,079,000	13,370,000
Cresol meta para, lb.	103,000	2,673,000
Phthalic anhydride, lb.	1,126,000	85,097,000
Phenol, lb.	negligible	116,760,000

[a]Include motor benzol which is less than one million gal. a month of domestic production; imports are almost entirely motor benzol which has to be refined before it can be used for styrene monomer.

Imports of chemicals from Europe stepped up considerably in the first half of 1950 over previous years as shown by Table II below when compared with Table I. Whether or not this rate can be continued during this period of world unrest is uncertain, but for the time being, at least, these foreign shipments are of inestimable benefit to plastics.

Table II—U.S. Imports of Chemicals of Interest to Plastics in 1937-39 and 1949

	Total yearly imports average 1937-39	*1949 imports*
Benzol, gal.	592,000	2,916,000
Naphthalene, lb.	41,245,000	50,000,000
Cresylic acid, gal.	1,437,000	1,247,000
Cresol meta para, lb.	.....	248,000
Phthalic anhydride, lb.	.....	2,319,000
Phenol, lb.	.....	154,000

Another surprising statistic for May was the United States production of benzol, as listed by the Tariff Commission, of over 17 million gal. including only 735,000 gal. of motor benzol. June production was 15,500,000 gallons. If the industry operates at this rate for the rest of this year, the amount of benzol produced in this country in 1950 would be more than 180 million gallons. If we are going to have that much domestic benzol plus the imports that are claimed to be on the way, there should be less squeeze on benzol than anticipated. The imported material which may run from 10 to 15 million gal. for the year plus the stepped-up domestic production (which included limited amounts of benzol from petroleum) should take care of the estimated demand for 180 million gal. in 1950.

Duplicated Figures—But there are two flies in the ointment. First the big benzol production figure reported in May probably includes a great part of the foreign imports. That happens because the tar distillers report the amount of their finished product regardless of where their crude material comes from, and it is assumed that at least part of the imported, unrefined benzol was sent to them for refinement. Thus, if the entire import figure is added to total benzol production in the U. S., it gives a false idea.

The second consideration is that the demand for benzol in products other than rubber and styrene is also constantly mounting. In fact, part of the imported material was purchased by one company entirely for use in detergents. The demand for DDT and phenol has picked up considerably, and so it goes for seven or eight other products that require benzol. Thus it is still a question as to whether the originally estimated amount of 58 million gal. of benzol will be channelled into styrene monomer. Somewhere near 25 million gal. will be needed for rubber. That would leave 33 million of the estimated 58 for plastics.

Here another angle enters. Styrene monomer producers have proved that they can operate at over a 500 million-lb. annual rate if all conditions including facilities, raw material, and transportation are ideal. But the production rate in the first four months of 1950 was only 444 million lb. annually so there isn't likely to be more than 475 million lb. of styrene monomer produced in 1950, even if the industry operates at a 500 million-lb. rate for the balance of the year. So if rubber gets its 200 million lb. of styrene

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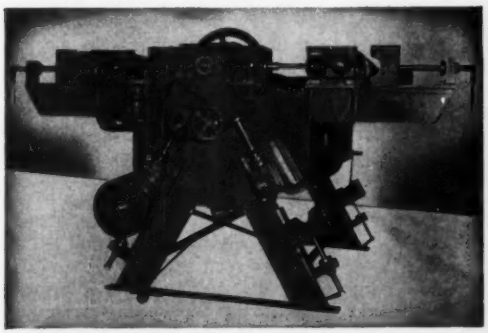

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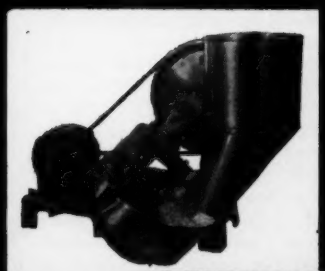

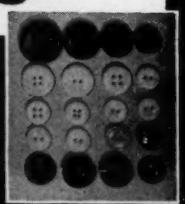

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monomer in 1950, there would be only 275 million lb. for styrene plastics—or almost 40 million less than was used in 1949. In 1951 rubber will demand 300 million lb. of styrene monomer but, as mentioned in this magazine last month, it is too early to figure out what will happen in that period; there are far too many factors involved.

Keep the Record Straight

A STATEMENT made recently on a radio program that a synthetic rubber plant had been acquired from the government and turned over to the production of plastics that were "somehow frivolous and less than essential" has been vigorously denied and answered by William O'Neil, president of The General Tire & Rubber Co., Akron, Ohio.

In answering the radio broadcaster's implication, Mr. O'Neil said: "The plant in question has been idle and deteriorating for five years.

"It was the first rubber plant to be shut down and was not deemed modern enough.

"It has been 'cannibalized' to the extent of about 25% and has been on the Government surplus list for more than a year.

"General Tire did not initiate negotiations for the purchase, but was invited to bid, and its bid of over $2 million was 65% above the government's own estimate of $1,375,000.

"Furthermore, the company offered to place the plant in position to make synthetic rubber within five months and agreed to convert to synthetic rubber immediately or to give the government the option of repurchasing the plant at actual cost."

S.P.E. Prize Papers

THE committee to judge the three best papers to be presented at the S.P.E. Annual Conference, Jan. 18-20, at the Statler Hotel, New York, N. Y., has been announced by Henry M. Richardson of DeBell & Richardson Co., who is chairman of the contest committee. Committee members are: Gerald H. Mains, National Vulcanized Fibre Co.; Albert G. H. Dietz, M.I.T.; R. G. Chollar, The National Cash Register Co.; Carl J. Frosch, Bell Telephone Laboratories, Inc.; and J. O. Reinecke, an industrial designer of Chicago, Ill.

Papers of interest to the plastics industry are being sponsored by local sections of the society and will be judged primarily on the basis of their value to the industry or the engineering profession and on the skill with which the subject is analyzed and presented. Papers must be presented by Nov. 15 to a local section. The first prize award is $200; second, $100; third, $50.

Further information may be obtained from the Society of Plastics Engineers, 409 Security Bank Building, Athens, Ohio.

Upholstery Material

ONE of the latest additions to the increasingly popular high luster-effect type of upholstery material has been developed by Textileather Corp., Toledo, Ohio. The product, a fabric-stabilized leathercloth, is obtained through the use of the new Excel type of vinyl coating which is said to give the material great tear strength and freedom from cut growth. According to the producer, the stabilized material has most of the advantages of unsupported film and none of its weaknesses, in addition to being popularly priced. It is available in 10 colors.

Vinyl Supply

RAW material, transportation, and production problems encountered by producers of vinyl resin and plasticizers in the last two or three months have resulted in the creation of a shortage, the duration of which cannot be foreseen as yet. The situation is indefinite because there are numerous things that might happen which would relieve the shortage in a comparatively short time.

The chlorine strike, now three months old, which cut chlorine production more than 20%, naturally hurt producers of vinyl chloride resins. DOP, which was quite plentiful until recently, has become scarce, despite increased production, because of both increased demand and a scarcity of phthalic anhydride. The latter shortage is said to be partially caused by a drop-off of foreign naphthalene which has been coming to this country in large quantities until mid-year. Titanium and other pigments needed for coloring vinyl compounds are also tight because of excess demand. A shortage of railroad cars and the temporary localized rail strike added to the problems of obtaining raw materials, and these are only part of current production problems.

Yet despite all these handicaps, the suppliers have been producing almost as much resin as ever. Very few plants have been shut down for lack of resin, but the big volume users in particular haven't been operating on as big a scale as they could if more resin were available.

On top of this critical supply situation came an unprecedented summer demand, in contrast to other years when there has always been a summer slump. This demand was particularly noticeable in the calendering field. Yet surveys indicate that consumer purchasing of film and sheet has *not* been at a high rate. It would seem then that there has been considerable stockpiling of film and sheet at various levels beyond that of the producers. This could be a dangerous situation if retail sales do not assume their expected heights in the late Fall and Winter months.

The shortage of resin probably looks worse than it really is because the industry is somewhat oversold. Just as soon as some of the above problems are liquidated and producers have a chance to use their facilities without interruption, there should be enough vinyl resin to meet all foreseeable demands, including military. It is not believed that any unusual quantities of vinyl will move into military channels until the second quarter of 1951, and there is as yet no positive evidence to indicate that even then will there be enough military demand to seriously curtail civilian use of vinyl. Of course, there is

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TERRIFIC OPPORTUNITY for high quality, lightweight material with necessary degree of optical clarity to mass produce one piece 16" television window and frame. Material must satisfy decorative requirements, reduce assembly operations, be adaptable to heavy production schedules and low in cost. Apply to the Product Engineer, the Admiral Radio Corp., 3800 Cortland, Chicago 47, Ill.

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TAKE A profit-wise look at your production set-up! Are you getting the best results at lowest costs with your present materials? Or perhaps you will find, as the Admiral Radio Corp. did, that plastics will do a *better* job at lower costs.

To keep pace with the tremendous television expansion, Admiral Radio Corp. constantly evaluates its production set-up for better methods and materials. You may discover in your product, as Admiral Radio Corp. did in their 16" TV window, that Styron (Dow polystyrene) worked exceptionally well. Styron possessed the high quality and necessary degree of optical clarity, plus the impact strength required to protect the 16" TV tube. Moreover, it was found that this window "made of STYRON" was easily painted without baking process . . . was mass-produced with a *minimum* rejection rate . . . was lightweight. All these features meant important cost savings that were not possible with previously used materials.

To help put Styron to work for them, Admiral Radio Corp. called upon the skilled services of the Custom Molder. They found his knowledge and experience in solving plastics design and engineering problems of inestimable value. Perhaps you, too, have a production problem that can be solved by using plastics.

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INCREASES PRODUCTION OUTPUT: Styron permits TV window with frame to be mass-produced in one piece with a *minimum* rejection rate. This facility of Styron to be mass-produced with continued high quality keeps Custom Molder's schedule up with the fast production pace of the Admiral Radio Corp. Dimensional stability of Styron gives accurate contours to TV window necessary to maintain clear image.

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Plastics Division—Dept. SOT-51

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the usual hedge: "providing the war doesn't go beyond Korea."

New Vinyl Plant

ANNOUNCEMENT has just been made of a new plant for the production of Geon polyvinyl chloride resins and other chemicals by B. F. Goodrich Chemical Co.

The new plant, to be completed in mid-1951, will cover seven acres on the company's 225-acre tract at Avon Lake, 22 miles west of Cleveland, Ohio, where there is located at present a general chemicals plant, experimental station, and currently under construction, an applied research laboratory. The vinyl resin plant will consist of two buildings—a three-story process building with 40,000 sq. ft., and a warehouse.

W. S. Richardson, president of the company, states: "The vinyls are certain to assume a vastly greater role than before because of a tremendous growth and diversification of the industry within the past five years, making a host of new products available in volume at low cost."

B. F. Goodrich Chemical Co. now operates plants in Louisville, Ky., Niagara Falls, N. Y., Akron, Ohio, and the government-owned synthetic rubber plant at Port Neches, Texas.

P.M.M.A. Activities

FOLLOWING the consolidation of Plastic Materials Manufacturers Association, Inc., with the Manufacturing Chemists' Association, Inc., William M. Rand, chairman of the board of M.C.A., has announced the appointment of the following former P.M.M.A. directors as members of the Plastics Steering Committee: D. S. Frederick, chairman; F. N. Williams, vice chairman; J. R. Hoover; A. N. Mann; M. G. Milliken; E. D. Ries; and J. L. Rodgers, Jr. Named to the Resin Adhesive Subcommittee are: P. A. Macy, C. J. Romieux, and E. E. Decker.

As announced in these columns last month, F. H. Carman, formerly general manager of P.M.M.A., has joined the Washington staff of M.C.A. and will continue to be active in the plastics program.

Continuing the work done by P.M.M.A. in the past, according to Dr. Frederick, former P.M.M.A. president, the Association will represent the plastic materials manufacturers as an industry group, particularly in cooperating with all government agencies and other associations and societies where such representation is appropriate.

Merger

THE Heat Seal-It Co., Philadelphia, manufacturer of heat-sealing equipment, and Globe Products Mfg. Co., producer of machine tools and specialties in Los Angeles, have been merged into a new firm to be known as Globe Products-Heat Seal Corp. Plants and offices are to be maintained in both cities.

H. L. Reitzes, former head of the Heat Seal-It Co. and vice president of the new firm, will be in charge of sales and promotion and will divide his time between the two plants.

Aniline Presses

THE hundredth aniline press made since production began a few years ago has just been delivered to Standard Cap and Seal Corp. by Kidder Press Co., Inc., Dover, N. H.

The press, called a Celloprinter, is primarily designed for printing cellophane and plastic packaging materials. These are high speed, one-man, four-color presses with a standard 30-in. printing width and are particularly applicable for printing on transparent plastic film used for packaging purposes.

Site for Polystyrene Plant

RECENT news reports from Connecticut stated that The Dow Chemical Co. had purchased a plot of ground in that state on which it expected to erect a new plant for the production of polystyrene.

When Dow officials were queried as to the authenticity of this report, they replied that a 78-acre site near New London had been acquired, but no decision had been made as to when construction will start. Company officials point out that styrene monomer may become critical because of the synthetic rubber program, but they also believe that polystyrene will be found useful for many war applications.

The site is on Highway 12 along the New York, New Haven & Hartford Railroad right of way, 10 miles north of New London on the Thames River. It is located so that styrene monomer from Texas can be unloaded at the site to facilitate service to eastern molders.

A western plant has also been decided upon, but officials are still looking over several possible sites. Plans for the new expansion program were made long before the Korean incident because of the growing demand for polystyrene.

The company had previously announced a $30 million expansion program for Freeport, Texas, where such chemicals as styrene monomer and ethylene would be produced.

COMPANY NOTES

Fabricon Products, Inc., Plastics Div., has announced the opening of a Chicago technical sales office at 112 E. Chestnut St. as part of its general expansion program. **H. C. Johnson** has been transferred from the main sales office in River Rouge, Mich., to head the new office.

Federal Tool Corp., 3600 W. Pratt Blvd., Chicago, Ill., has purchased mold and die equipment for a number of proprietary items from **Amos Plastics Co.**, Edinburg, Ind., and will continue to manufacture these items in addition to its own line.

U. S. Rubber Co., Naugatuck Chemical Div., has announced the appointment of **John C. H. Wendes** as production manager and **Joseph P. Monahan** as general control manager of that division.

J. O. Ross Engineering Corp. has moved its offices to 444 Madison Ave., New York, N. Y.

Erie Resistor Corp., Erie, Pa., has announced that **Rear Admiral C. A. Rumble**, USN (Ret), formerly Head of the Electronics Branch in the Office of The Chief of Naval Operations, has joined the company as manager of the Washington Division.

(*Continued on p.* 184)

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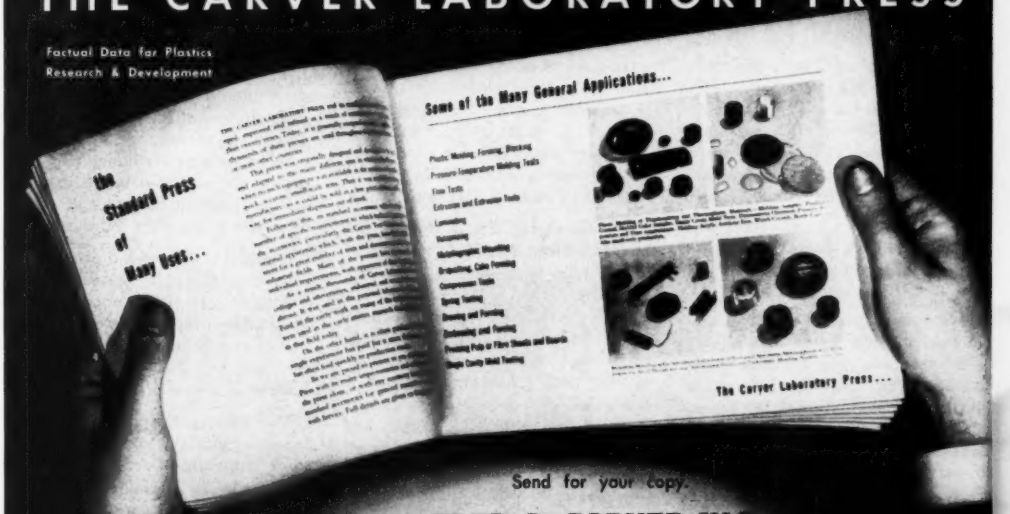
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PLASTISCOPE

Admiral Rumble will have his headquarters in Washington, D. C., where he will handle government contacts for Erie Ceramicons and other electronic components made by Erie as well as custom molded parts produced by the Plastics Division.

Tinnerman Products, Inc., has changed its mailing address to P. O. Box 6688, Cleveland 1, Ohio.

Monsanto Chemical Co. has announced that **Eli Perry** and **Robert J. Schatz** have been appointed assistant directors of research in the Plastics Division. **Robert W. Jones, Stuart H. Rider,** and **Roland J. Bourke** are group leaders in the Research Dept.

American Cyanamid Co., Plastics and Resins Div., has announced a price increase of 1½¢ per lb. on shipments of less than one drum and ¾¢ per lb. on all other quantity brackets of Beetle Molding Compounds T-298 black and C-498 brown.

Morton-Withers Chemical Co., Greensboro, N. C., has announced a new line of plasticizers. Morflex 100 is an octyl phthalate characterized by good electrical properties and extreme resistance to heat and light aging. Three additional products, iso-octyl sebacate, iso-octyl adipate, and a special product designed to give both low-temperature flex and high-temperature stability will be available shortly. Production facilities capable of producing 1 million lb. a month by the end of the year are promised. Sales will be handled by **Burgess Pigment Co.,** 64 Hamilton St., Paterson, N. J. and **Van Horn, Metz & Co., Inc.,** 508 Noble St., Philadelphia, Pa.

Hachmeister, Inc., 2332 Forbes St., Pittsburgh, Pa., which purchased the former **Avco, Inc.,** plant at Circleville, Ohio, has announced a long-term lease with **Plastics Corp. of America,** a new firm recently organized to manufacture plastic wall tile.

Celanese Corp. of America has announced that the new $27 million high alpha cellulose plant of its subsidiary, **Columbia Cellulose Co., Ltd.,** located at Prince Rupert, B. C., is expected to come into production during the first quarter of 1951. Company plans call for production of high alpha cellulose at a rate initially in excess of 200 tons a day.

The Goodyear Tire & Rubber Co. has announced that **E. J. Dunlavy** of the Vinyl Film Sales Dept. has been transferred from Akron to the New York office. Also revealed is the elevation of **Merle E. Wendt** from vinyl development production service head to assistant manager of Chemical Products Development Division. **Kermith K. Fligor** has succeeded to Mr. Wendt's former position.

Mayflower Electronic Devices, Inc., 6014 Hudson Blvd., West New York, N. J., is now operating a new three-way press that uses three different size and type electrodes. The machine is capable of doing progressive bonding, such as putting the collar and pocket on a raincoat and the flap on the pocket in progressive operations without requiring the operator to release the coat.

Minneapolis-Honeywell Regulator Co. has announced the following personnel changes: **Charles R. Woods** has been named valve division sales manager for the southwest region; he is succeeded by **Edward J. Byrne** as industrial manager of the Dallas branch. **Howard W. Griesbach** has been appointed industrial manager of the Milwaukee branch.

Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp., has announced the completion and initial operation of facilities for the production of ethylene oxide at Whiting, Ind., in line with the company's planned increase in production of that material.

B. F. Goodrich Co. has established a warehouse for Koroseal upholstery material at High Point, N. C.

Atlas Mineral Products Co., Mertztown, Pa., has announced the following personnel changes: **Edison C. Sickman** has been named general sales coordinator: **Ray Russell Graver** has joined the engineering department; and **Gerald F. Gilbert, Jr.,** has been named assistant to the technical director.

Synvar Corp., Wilmington, Del., has established a new distribution center in Valdosta, Ga., from which point it will ship resin to plywood and furniture manufacturers in the southern states. Manufacturing processes are expected to be installed at that distribution center at a later date, the corporation announced.

Bjorksten Research Laboratories, Madison, Wis., has announced the following personnel appointments: **Dr. Earle A. Weilmuenster** is section leader in organic synthesis; **Stephen Marshall** and **Robert J. Roth** have joined the research staff.

The Visking Corp. announces the following changes in production and sales supervision of the plastics division in Terre Haute, Ind.: **E. B. Cahn,** general manager; **J. Bernard,** sales manager; and **H. Harris,** general sales supervisor. **L. E. Houck** has been appointed assistant general manager of the company's cellulose casing division in Chicago.

Reichhold Chemicals, Inc., Detroit, Mich., has purchased property and a plant containing 150,000 sq. ft. of floor space at 7738 W. 61st Pl., Argo, Ill. The new unit will be devoted to production of a full line of synthetic resins for the paint, varnish, printing ink, paper, laminating, insulation, and textile industries, and to the manufacture of a complete range of organic and inorganic chemical pigment colors. This is the eighteenth plant in the company's world-wide organization—eight in the United States and ten in foreign countries.

Tom Lawson Associates, 8 W. 40th St., New York 18, N. Y., has announced the development of large size polyethylene containers for transporting corrosive chemicals which are light weight and inert. The bottles are formed of two parts with ⅛-in. wall sections, molded to shape and heat sealed to form a full round container capable of withstanding internal pressures of at least 200 p.s.i.

Kenrich Corp., 120 Wall St., New York 5, N. Y., has announced a reduction of 4 to 7¢ per lb. in the

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- PX-[illegible] Dibenzyl Sebacate
- PX-[illegible] Di(2-Ethylhexyl) Sebacate
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PLASTISCOPE

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PERSONAL

Philip Richard Monaghan has joined the sales department of **Jefferson Chemical Co., Inc.**, 711 Fifth Ave., New York, N. Y.

D. Gray Weaver has been transferred to the Newark, N. J., office of **Acheson Colloids Corp.**, Port Huron, Mich., where he will assist in technical and research problems.

Willard R. Barrett, formerly vice president and general manager of the **Hoosier Cardinal Corp.** of Evansville, Ind., has been named sales manager for **Plastics Div., General Electric Co.** Mr. Barrett has been with the Hoosier Cardinal Corp. for the past three years. Prior to that he was associated with **Du Pont** for 24 years.

Morey Weisman has joined **Thermoplastic Fabrics Corp.** as general merchandise manager of the Cast Vinyl Film Division. He was formerly sales manager in the **Plastics Div., Cohn-Hall-Marx.**

William M. Shine has joined the plastics department of **Arnold, Hoffman & Co., Inc.**, and will be located in its New York office in the Empire State Building. He was previously associated with **General Aniline & Film Corp.** and **General Electric Co.**

Vernon R. Childress has joined the Marketing Div. of **General Electric Co.'s Chemical Department.**

Robert J. Grasley has been appointed head of the technical staff of **Resin Industries**, Santa Barbara, Calif. He was formerly with **Plastic Wire & Cable Corp., Electrical Insulation Corp.** and **Welding Engineers, Inc.**

R. A. Dittbrenner has been appointed eastern representative for **Carboline Co.**, 7603 Forsyth Blvd., St. Louis 5, Mo., to handle advertising and sales promotion for the concern's line of thermosetting and thermoplastic coatings and linings for erosion and corrosion service.

Frank Wallis has joined the sales staff of **Zenith Plastics Co.**, Gardena, Calif. He was formerly with **Narmco**, Los Angeles.

Dr. Max T. Goebel has been appointed technical director of Du Pont's **Grasselli Chemicals Dept.**, succeeding **Dr. John C. Woodhouse.**

R. G. Tabors has been named manager, **Hydraulic Press and Power Tool Dept., The Baldwin Locomotive Works,** Philadelphia 42, Pa.

Frank Schleicher has been appointed assistant to the manager of **Synthane Corp.'s** Milwaukee sales office, serving Wisconsin, Minnesota, and northern Michigan.

Forest B. Evans has been named assistant to the general manager of the **Virginia Cellulose Dept., Hercules Powder Co.**, Wilmington, Del. **Orval J. Hand** succeeds him as manager of the Hopewell, Va., plant.

Bradley Dewey, Jr., has been appointed manager of **Cryovac Div., Dewey & Almy Chemical Co.** to head the sales, manufacturing, and research activities of that branch.

Warren E. Hill has been named vice president and general manager of the Shellmar Div., **Shellmar Products Corp.**, Mount Vernon, Ohio. He will be in charge of sales and production activities of package material conversion plants at Mount Vernon and Zanesville, Ohio, as well as the company's 17 sales offices located throughout the country. Mr. Hill has been in the plastics industry since 1930 when he became associated with the **Pro-Phy-Lac-Tic Brush Co.**; he was elected vice president of that firm in 1936. **Ben Verson,** who has been acting as general manager of the Shellmar Div., will now devote his entire time to his position as treasurer.

Stephen B. King has transferred to **The Grote Mfg. Co.**, Bellevue, Ky., from **DeBell & Richardson, Inc.**, Hazardville, Conn. This is the third instance this year where technical men have accompanied projects from their development in the laboratories of DeBell & Richardson, Inc. to commercial production. In February, **Fred E. Wiley** transferred to Grote as chief engineer; and in May, **Donald W. Biklen** transferred to **Orangeburg Mfg. Co.**, Orangeburg, N. Y.

Vincent L. Kiernan has been named sales manager for refrigeration and injection molded parts produced by **Panelyte Div., St. Regis Paper Co.**, 230 Park Ave., New York 17, N. Y. **John M. Zeier** will succeed him as New York district sales manager for that division.

N. W. Smith, Dominion Rubber Co., Ltd., has been elected chairman of the Quebec Rubber and Plastics Group for 1950-1951.

Deceased

George W. McIntyre died suddenly on Aug. 29, 1950. He had been manager of the New York office of **Reed-Prentice Corp.** since 1926.

MEETINGS

Oct. 6—Detroit Rubber and Plastics Group, Hotel Detroit Leland, Detroit, Mich.

Oct. 18-20—S.P.I. Annual National Conference, New Ocean House, Swampscott, Mass.

Oct. 19-20—Technical Association of the Pulp and Paper Industry, Paper and Plastics Conference, Marshall Hall, New York State College of Forestry, Syracuse, N. Y.

Oct. 24—Association of Consulting Chemists and Chemical Engineers, Annual Meeting, Hotel Shelburne, New York, N. Y.

Nov. 1-3—The American Society of Body Engineers, Fifth Annual Convention, Rackham Memorial Building, Detroit, Mich.

Nov. 6—Thirty-fifth National Hotel Exposition, Grand Central Palace, New York, N. Y.

WALLET INSERTS.
Material: Kodapak I Sheet, clear.
Suggested gauge: .005″.

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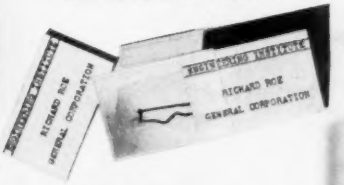
Material: Kodapak I Sheet, clear.
Suggested gauges: .003″ to .0075″.



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CHOICE PLASTIC EQUIPMENT AT TERRIFIC SAVINGS: #00 Banbury Mixer with controls and motor with 2 Roll Lab Rubber Mill, complete set up. #3 & #9 Banbury Mixers with AC motors. Ball & Jewell #1½ Rotary S.S. Cutter with 30 HP motor. Farrel 4 Roll Plastic Mill 12" x 26" with 25 HP motor. 1-2-4 & 6 oz. Injection Molding Machines all makes. ½" and 1" Lab. Extruders National & Royle. Stokes #280 Press. Thermo up. #3 3 Roll vertical Calender 14" x 40". Preformers single & rotary punch—all sizes, all makes. Heavy duty Mixers, sigma blades, Jacketed & Unjacketed, all makes, all sizes. Phone SOuth 8-4451 - 9264 - 8782. You can BANK on the Equipment Clearing House, Inc., 289 10th St., Brooklyn 15, N. Y.

FOR SALE: Injection Presses: 6 oz Reed, 4 oz oil heated HPM, 6 oz Grotelite, 3 oz Monton, 1 oz vert. Benchtype NRK. Extruders: 3½" dbl. extd. oil heated Royle. 1—Cumberland No. 1½ granulator. Ovens. 2—Impco Mold Temp. Circulators, 1— HPM 9 oz Hastelloy Heat. Chamber. 1—Lab. Baker Perkins Mixer. 1—Lab. Banbury Mixer. 1—6 vert. drawer Preheat Oven for 4' x 5' Acrylic or Royalite sheets. 2—Electronic HF Generators & Sealers f. Vinyls. 1—300 ton Watson Stillman Compression press and many other sizes compression presses. 1—150 ton Stokes mod. 232 autom. Closure press. 1—Laminat. press mult. open. 30" x 60" plat. 1—Lamin. Press 36" x 32" plat. 1—Stokes R Preform press. 1—Kux No. 25 rotary Preformpress. 1—Northrop 6 stat. Micromax Temp. contr. recorder. 1—Eclipse 3 HP gas boiler. Justin Zenner. 823 W. Waveland Ave., Chicago 13, Ill.

FOR SALE: One New 4 oz. Lester Injection Molding Machine, used about 40 hours. In excellent condition. Two Dunning & Boschert Presses, 8" rams, chrome plated, complete with pull backs. Serial #4245 and #4508. One brand new Stokes Tablet Machine (single punch 2" pill) Model "T" Serial #B10755. Type VEU-GH. One Stokes RDA Rotary Tablet Machine. 16 dies. In good condition. One nearly new Stokes Rotary Tablet Machine RB2, 16 dies. Serial #A1063. Reply Box 695, Modern Plastics.

MACHINERY AND EQUIPMENT FOR SALE 9 oz. Hastelloy Heating Chamber. New-never used in production. Built by HPM. Reply Box 705, Modern Plastics.

Something New has been added to the Rubber and Plastic Equipment business. F. M. C. Rental Purchase Plan on Banbury Mixers, Rubber Mills, Extruders, Hydraulic Presses. Injection Molding machines, Stokes Tablet Presses, Rotary Cutters, Double Arm Mixers, and similar equipment. Send us your Inquiry. First Machinery Corp., 157 Hudson Street, New York 13, N. Y.

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12 oz. Lester Phoenix Guaranteed excellent, used approx. 6 mos. Extra new parts	$12,500.00
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6 oz. W.S., new '42	4500.00
1½ oz. W.S., New '42	2500.00
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Southwk. latest type, 200 T, 24"x54"	Offers
H.P.M. 200T, SL Type, ram 14" x 13½", platen 36" x 36"	Offers
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Farrell 100 to 300 ton, platens 18" x 24" to 24" x 36"	800.00 up
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Loewy, 2500PSI, 270 gal. '44	8500.00
H.P.M. 2200PSI, 20 gal., new '43, 15HP	1250.00
New Vicker's M. V135, 15HP, 1000#, 176GPM	495.00
Northern, 15GPM, 15HP, 2600#, excellent	750.00
MISCELLANEOUS	
Farrel Reducer 500HP, new '43, 5 to 1	2500.00
P&W Model BL2416, Keller Duplicator, Plastic	6500.00

EVEREADY CO., E. J. McCALLUM, PRES. 805 Housatonic Ave. Bridgeport, Conn.

Machinery and Equipment WANTED

WANTED: 2½" & 6" plastic extruders—8 oz. to 12 oz. Reed Prentice—2 & 5 H.P. grinders—lab mill—60" mill. SEND COMPLETE DETAILS TO BOX 683, Modern Plastics.

Hastelloy cylinder wanted, for 250-H-9 HPM injection press. State condition and price. Thermold Corporation, Clinton, N.Y.

WANTED: 8 or 12 oz. Reed-Prentice injection molding machine. SYLVANIA ELECTRIC PRODUCTS, INC., WARREN, PENNSYLVANIA.

WANTED: 8 oz. Leominster Injection Machine, give model, year serial number, true condition, location and best price. Reply Box 694, Modern Plastics.

Materials Wanted

WANTED: PLASTIC Scrap or Rejects in any form. Accetate, Butyrate, Polystyrene, Acrylic, Vinyl Polyethylene, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding, magnetizing and compounding. Reply Box 675, Modern Plastics.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic and Ethyle Cellulose. Reply Box 676, Modern Plastics.

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate. Custom grinding, magnetizing, compounding, and straining of contaminated plastics. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. ES 5-7943.

WANTED: Surplus inventories of virgin injection molding compounds in any quantities from 1000 pounds up. Will pay premium prices where prevailing. Dussi-Wallace and Company, 60 East 42 Street, New York 17, New York.

SURPLUS UREA MOLDING POWDER WANTED. Reply Box 678, Modern Plastics.

(Continued on page 192)

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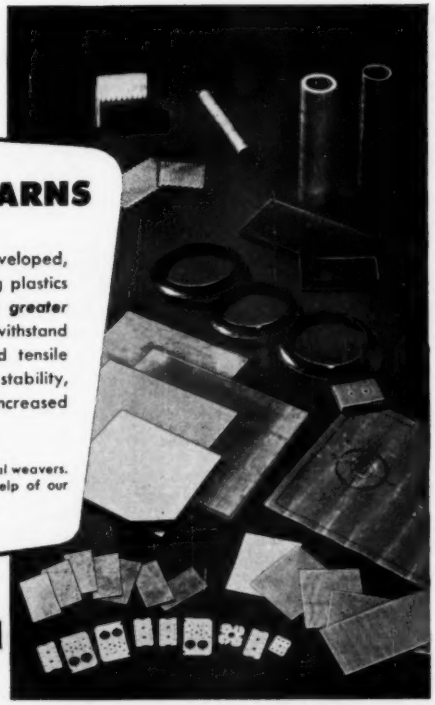

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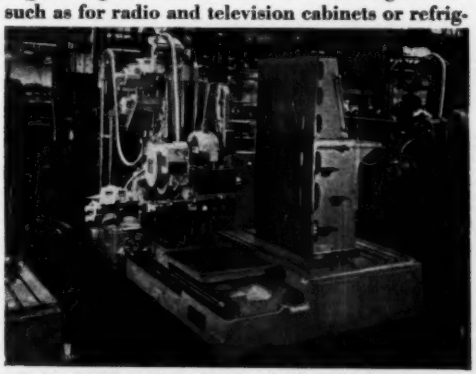

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(*Continued from page* 190)

WANTED: Vinyl film, opaques, translucents, metalics, plain or printed, any quantities. Continental Lacquer Co., 495 Flushing Ave., Brooklyn, New York.

WANTED: Plastic Scrap, rejects, cuttings, Vinyls, polyethylene, styrene, acrylic, cellulosics. Custom grinding. American Vinyl Corp., 65 Steuben St., Brooklyn 5, N. Y.

WANTED: Surplus Quantities of Virgin Polystyrene and Cellulose Acetate; Clear, Standard Colors, and Special Colors. Any Quantities. Write, wire, phone: Alfred A. Rosenthal, 3 Park Row, New York 7, N. Y. REctor 2-2747.

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FOR SALE: .187 Amber and .187 Black Plexiglass, 3 feet x 4 feet. Quantity—below list. Reply Box 702 Modern Plastics.

FOR SALE:—15 tons Arocior 1270; 15 tons Brown Molding Powder, Cresylic Type; 2 tons each Black Bakelite 1895 and 6102; 5 tons Recovered Cellulose Acetate; 3 tons Recovered VYHH. Chemical Service Corp., 96-04 Beaver St., New York 5, N. Y.

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MECHANICAL ENGINEER: experienced in plastics injection molding. Complete knowledge of mold designing and modern production methods. Excellent opportunity with well established injection molder in northern New Jersey. Submit resume. All replies kept confidential. Reply Box 677, Modern Plastics.

REPRESENTATIVE WANTED — Experienced Philadelphia custom molder of injection, compression and transfer plastics requires commission man experienced in plastics field to cover North Jersey and General vicinity New York City. Plant capacity up to 1,000 tons compression and 48 ounces injection. State experience and reply Box 682, Modern Plastics.

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WANTED: Man for sales and technical service on molding compounds. Should have technical education and some experience in molding field...
In reply give education, previous employers, salary, and reasons for leaving. Reply Box 703, Modern Plastics.

WANTED: Sales development man for laminating and industrial resins. Should have technical education and at least 3 years experience in one of above fields and preferrably some sales experience. In reply give education, previous employers, salary and reasons for leaving. Reply Box 704, Modern Plastics.

EXTRUSION FOREMAN: N. Y. Plastics Mfr. adding Extrusion Dept. requires Foreman to take complete charge. Must be experienced with all types of plastics. Reply giving full details and salary wanted to Box 711, Modern Plastics.

Situations Wanted

LAMINATION, EXTRUSION, COATING. Production and development. Experienced as technical director in both electrical and chemical fields. Textiles, papers, films and flexible metals industrial and defense packaging materials and products including pipe and thin polyethylene film. Inorganic and organic resins and rubbers. Can be available for two days per week on permanent basis. Reply Box 692, Modern Plastics.

PLASTICS ENGINEER: Seeks permanent association with custom molder. Graduate Chemical Engineer. Age 25. Two years production, development and technical service experience — injection, compression, and transfer molding. Will consider any phase of business suitable to training and experience. Complete personal abstract upon request. Reply Box 679, Modern Plastics.

EXPERIENCED EXTRUSION SUPT. OR SUPERVISOR: Toolmaker, fixture designs. Dept. Foreman; office or plant. General Manager. Sales: wide practical experience. Not afraid of hour or work if appreciated. Can travel, have perfected marketable products. Estimating, purchasing, experienced in shapes and tube most material's, very handy with machinery. Best References. Some injection molding experimental. Know the plastic business. Executive type or work in plant. Reply Box 686, Modern Plastics.

Plastic Engineer and Manager. Licensed mechanical engineer with ability and experienced in operating tool room, mold room and finishing with high speed injection, transfer, compression and low pressure molding. Proven ability to design product, tools, and equipment, to set and operate entire plant. Reply Box 690, Modern Plastics.

Mechanical Engineer: Experienced in plastic injection molding. Complete knowledge of mold designing and modern methods of production. Some experience in extrusion molding; time study. Desire position in New York or New Jersey area. Reply Box 708, Modern Plastics.

Miscellaneous

SALES REPRESENTATIVES: Established custom molder offers attractive commission arrangements for live-wire salesmen of injection, compression, transfer, extrusion and cold molding, casting, fabricating and short run experimental work. Facilities include complete tool shop and expert engineering assistance. All territories open. State previous experience. Reply Box 680, Modern Plastics.

AVAILABLE FIELD SERVICE: Rolls regroun.., restored to original finish, shape, or crowns altered. Rust removed, indentations or holes satisfactorily refilled, insuring a smooth surface. Any roll problem, open for consultation. Unnecessary to remove rolls from frames, work done without interruption to production. Fully insured in all localities. Reply Box 681, Modern Plastics.

FOR SALE
Manufacturing plant, 32,000 sq. ft. and approximately 2 acres. All brick walls, slate roof, wood and concrete floors, steam heated. Concrete loading dock on NYC. R.R. Suitable for many types of manufacturing. Excellent terms. B. F. Pence, Box 306, New Castle, Ind.

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A Western European plastics fabricator having large marketing facilities is interested in new applications, particularly of vinyl, polystyrene and polyethylene. Would consider import of finished products or manufacturing agreements. Reply Box 693, Modern Plastics.

FOR SALE:—one (1) 30 cavity compression mold for Knife Handle 3½" long. Also, one (1) 36 cavity compression mold for Knife Handle 2 13/16" long. These molds are flash type in excellent condition. Reply Box 684, Modern Plastics.

FOR SALE: Dies to manufacture very hot item now being used in the United States and Canada. Will also turn over orders for over 125,000 now on hand. Partners selling reasonable. Reply Box 691, Modern Plastics.

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WANTED TO BUY—INJECTION MOLDED LETTERS OF ACRYLIC AND POLYSTYRENE. Sizes ¼" to 4" or larger. Channel, pinback or plain, all styles, all colors. Send sample or illustration and prices. Reply Box 700, Modern Plastics.

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INJECTION MOLDING PLANT
Prefer capacity to 12 oz., fully equipped and operating. Retain personnel. Submit complete details in confidence. Box 701, Modern Plastics.

INDUSTRIAL SALESMAN: Chicago Area, Age 33—ten years experience. Do you require the services of a man experienced in the plastic field who has excellent industrial contacts in this territory?? If you are an established manufacturer desiring such representation, further detailed information will be furnished at your request. Reply Box 709, Modern Plastics.

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For further information address Classified Advertising Department, Modern Plastics, 122 E. 42nd St., N. Y. 17, N. Y.

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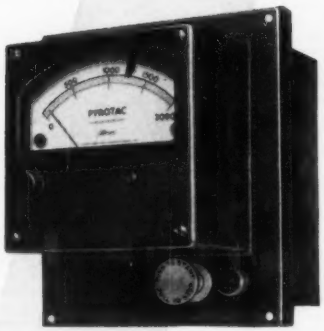

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Plastics fabricators can use setups similar to this fixture for cementing, bonding, or machining of plastics parts. Features making "De-Sta-Co" Toggle Clamps "the answer" for tooling up these operations include

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- Precision construction that assures perfect work alignment
- Low first cost, making possible efficient, inexpensive fixtures
- Wide range of models . . . a type for every application

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Sales Department: 251 West 19th St., New York 11, N. Y.

ATLAS FADE-OMETERS AND WEATHER-OMETERS

. . . playing an important part in improving the quality of **PLASTIC PRODUCTS . . .**

The destructive effects of sunlight on plastic products such as hardening, loss of flexibility, cracking, change in color, etc., can be determined with speed and accuracy in the Atlas Fade-Ometer.

In making tests, samples are rotated in holders around the Atlas Enclosed Violet Arc—the closest approach to natural sunlight—with temperature and humidity regulated according to requirements of test. Holders are available for three sizes of samples, 2½" x 4¾" capacity 42 samples, 2½" x 8" capacity 21 samples, 6¼" x 10" capacity 9 samples. Tests can be duplicated at any time thus providing reliable data in product development work.

Operation is completely automatic and the Fade-Ometer can safely be left running continuously for 24 hours without attention. A few hours or days testing in the Fade-Ometer equals months or years of exposure to actual sunlight.

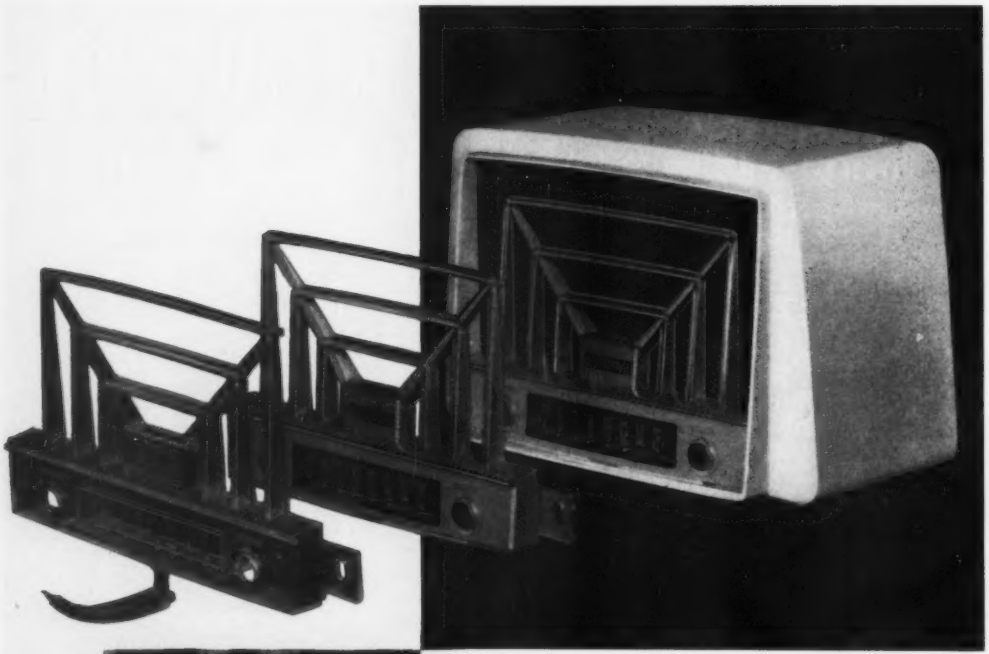
Fade-Ometer tests are fast becoming accepted as a yard-stick for standardization in the plastic field as they have been in the textile, paint and other industrial fields for over twenty-five years.

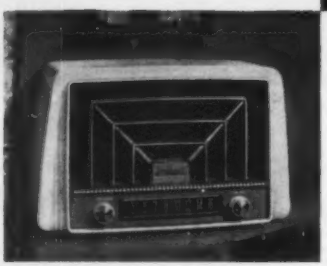
The Atlas Twin Arc Weather-Ometer is used to duplicate the combined weathering effect of sunlight, rain, heavy dew, and thermal shock for plastic products exposed to outdoor use. Like the Fade-Ometer it is completely automatic in all operations. The cycle timer can be set for duplicate tests at any time.

Write for further information in relation to your problem for testing plastic materials.

ATLAS ELECTRIC DEVICES CO.

361 W. Superior St., Chicago 10, Illinois





Courtesy Westinghouse Electric Corporation

Important Members of WESTINGHOUSE'S Latest Cabinet

Working with Westinghouse on moulded plastic radio cabinets is a familiar and pleasant experience for us. Sitting in on this latest Westinghouse cabinet is no exception, especially when praise for its beauty has sprung up from so many different places. To us it's another good case of utilizing our all-inclusive skills to the full, from die designing to the unique two-color spray painting of the grill. Let this case of close co-operation with Westinghouse serve as an example of our ability to act as the plastics department of YOUR plant.

WMP Custom Mouldings are of Custom Made Quality

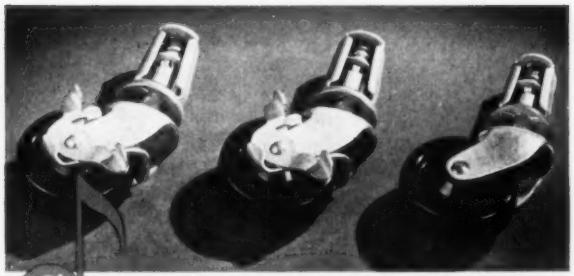
WMP

Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.

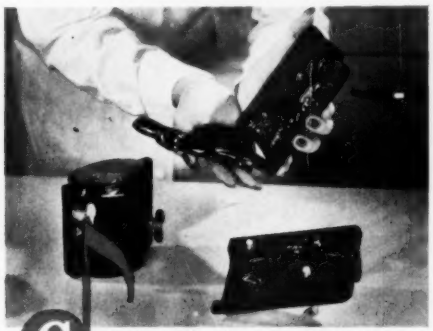
17 East 42nd St., New York 17, N. Y.



Caster wheels. Strong, durable, chemical resistant, for Maytag Washing Machines. They're molded of BAKELITE Phenolic Plastic by Banner Plastics Corp., Maywood, Ill. and supplied by The Nagel-Chase Mfg. Co., 2811 No. Ashland Ave., Chicago 13, Ill.

Cooking utensil handles. some, heat-resistant, cool-to-the-touch BAKELITE Phenolic Plastic forms the handles for nationally known "Farberware" utensils. Molded by Harry Davies Molding Co., 1428 North Wells St., Chicago 10, Ill.

Coin tills. Light, smooth, wear-resistant. They're for Ohmer cash register drawers. Molded of BAKELITE Phenolic Plastic for Ohmer Corp., subsidiary of Rockwell Mfg. Co., by John Mack & Son Molded Products, 6227 No. Broadway, Chicago 40, Ill.



Candy molds. They are low in cost, long-lasting, easily made, easy to use, because they're molded from BAKELITE Phenolic Plastic by Abar Plastics Co., 6940 Formosa Way, Pittsburgh 8, Pa.

Four "C's" that Hit "High C" in Quality!

Four jobs that no other material could perform so satisfactorily at such low cost!

That's the story of these four products—whose manufacturers unanimously chose BAKELITE Phenolic Plastics to assure strength, utility, ease of production, fine appearance, and economy.

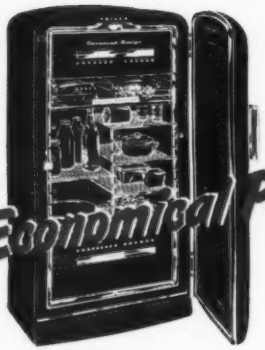
Add to these features smooth lustrous finish, light weight, resistance to chemicals and moisture, ease of molding, together with excellent electrical properties. No wonder BAKELITE Phenolic Plastics are first choice of so many companies for solving problems, simplifying production, and selling products!

If you can use these qualities...and more... in your products, large or small, why not draw upon the forty years of experience of Bakelite engineers. They will see to it that you get the right BAKELITE Phenolic Plastic for your requirements. Write Dept. BB-13 today!

Bakelite TRADE-MARK *Phenolic* PLASTICS

BAKELITE DIVISION UCC

BAKELITE DIVISION, *Union Carbide and Carbon Corporation,* 30 East 42nd Street, New York 17, New York



For Economical Plastics Parts* Production ON LONG-RUN JOBS

* General Electric molds plastics snack boxes, freezer doors, and meat trays for handsome new Philco refrigerators. These plastics units are light in weight, extremely durable, and easy to keep clean.

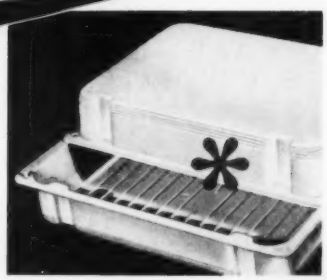
DEPEND ON THIS SPECIALIZED MOLDING SERVICE

Here's an efficient plastics molding service that specializes in BIG JOBS—where tremendous plant capacity and the most modern press equipment can offer users of plastics parts low costs and quick delivery.

General Electric has had years of experience in custom molding products and parts for the appliance field, where large-volume runs and large-size parts are common. G.E. can economically produce big parts like crisper boxes for refrigerators, washing machine agitators, front panels and louvers for room coolers, fan bases and motor housings, radio and television cabinets.

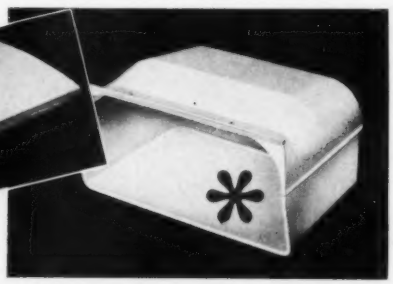
General Electric's modern molding plants, strategically located in the East and Midwest provide fast delivery on all types of plastics molding and extruding. HOW CAN YOU BENEFIT FROM G.E.'s PLASTICS MOLDING SERVICE? Write us on your company letterhead for information and for a free copy of the interesting booklet, "Your Plastics Dollars Worth." It may save *you* money. Department Y3, General Electric Company, 1 Plastics Avenue, Pittsfield, Mass.

TWO-PIECE FREEZER DOOR



MEAT TRAYS

ONE-PIECE FREEZER DOOR



SNACK BOX

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GENERAL ELECTRIC